Health Care Financing Conference Proceedings

Physicians and Financial Incentives

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Health Care Financing Conference Proceedings

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This report consists of papers presented at a conference on physicians and financial incentives held at the Washington Hilton Hotel, Washington, D.C., February 27-28, 1978, sponsored by ORDS.

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Physicians and Financial Incentives

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Introduction and Overview

by Jon Gabel

The Physician Sector: Cost, Access and Quality Concerns

One of the long-standing favorites of the American family's six and one-half hour daily viewing of television is the T.V. doctor. Never wrong and supremely confident, the T.V. doctor will make a diagnosis, cure the patient, and perhaps straighten out the patient's emotional life all in the space of an hour. T.V. doctors have two distinguishing characteristics: First, they care for only one patient at a time; second, there is no mention of money.

The following series of papers presents what you will never see on prime time television. The reality of American medicine is that the typical American physician treats more than 120 patients a week (American Medical Association, 1978). Whether you are one of those patients may depend on your income and your health insurance. In turn, your health insurance and income may determine the style and quality of care you receive. The physician will bill you for his or her services. That doctor's bill is likely to be more than 50 percent higher than the same bill four years ago (Dyckman, 1978).

In the world of medicine, the physician is the key decision maker governing entry to, and use of, the medical care system. The physician determines the course of treatment for over 70 percent of medical care services. Therefore, the incentives contained within physician payment systems will affect not only the use of physician services, but more importantly the use of hospital, nursing home, and other medical care services. In 1977, expenditures for physician services were $32 billion, while non-physician health expenditures were $131 billion (Gibson and Fisher, 1978). Fee-for-service payment, with its associated incentives, is and will probably remain the predominant payment mechanism for physicians. Presently, an estimated 75 percent of the 330,000 U.S. patient-care physicians practice fee-for-service medicine. The remaining physicians are largely salaried interns and residents (Gabel and Redisch, 1979).

In 1977, approximately 60 percent of physician revenues were from third party payers. Medicare and Medicaid accounted for 20 percent of physician incomes. Blue Shield private plans and other commercial insurers accounted for the rest of the third party payments to doctors (Gibson and Fischer, 1978).

Cost containment, improved access to care, and assured quality of care are the principal public policy concerns about the physician sector. Since the passage of the original Medicare and Medicaid legislation, a gradual but pronounced shift has taken place, away from issues of access and toward constraining the rising cost of medical care. Between fiscal years 1976–78, without any significant expansion in the benefit package, Medicare and Medicaid expenditures increased from $26.2 billion to $36.5 billion—a 39 percent increase (Gibson and Fischer, 1978). This $10.3 billion increase accounted for 14 percent of the increase in the Federal budget. Continued increases of this magnitude render any hopes for a balanced budget or expanded social services more remote.

In the three and one-half years following the expiration of wage-price controls in April 1974, the physician services component of the Consumer Price Index (CPI) increased at an annual rate of 11 percent, compared to an overall CPI rate of 7.3 percent. Yet, CPI figures may understate inflationary trends. During this period, total expenditures for physician services grew at an annual rate of 16 percent. Since 1974, annual expenditures of the Medicare and Medicaid programs for physician services have increased 24 percent and 12 percent, respectively (Gibson and Fischer, 1978). Thus, inflation in the physician sector is not only a question of pure price inflation, but also one of increasing quantity and complexity of services and changed labeling (e.g., a "routine visit" becomes an "intermediate visit").

Increases in the quantity and complexity of services have the most pronounced effect on medical expenditures in the $68 billion hospital sector. These increases can be traced to physicians' patient care decisions. As Redisch states, ". . . it is the physician. . .who directs most of the major resource decisions made in the hospital setting. The physician recommends the admission, takes responsibility for ordering diagnostic procedures and therapeutic measures and determines when the patient is fit to leave the hospital." While expenditures for hospital services have increased by 18 percent per year since 1974, the most dramatic cost increases have occurred in the physician-controlled ancillary services departments (Redisch, 1978). One of the major research questions considered in this conference was the effect of physician payment incentives upon hospital costs.

Access to care continues to be a major concern for millions of Americans. Due to a physical scarcity of health manpower, the Public Health Service of HEW has designated portions of over one-third of the nation's counties with 27 million residents as medically underserved (Unpublished data, HRA, 1976). Financial barriers are the major impediment to care for over a quarter of the U.S. population. Twenty-three million Americans, most of them unemployed or employed in small non-manufacturing businesses, are without health insurance (Corder, 1978). Approximately 19 million Americans, most of whom earn between five and ten thousand dollars a year, have very meager individual health insurance policies (Unpublished data, Bureau of Census). Forty-three million elderly or poor Americans are covered by the Medicare and Medicaid programs.[1]

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[1] Four million of these are joint Medicare-Medicaid beneficiaries (unpublished data, Health Care Financing Administration).

Quality of care is another major public concern. The quality of non-mainstream care in infamous "Medicaid mills" received national media coverage with the visit of Senator Moss to a Harlem mill in January 1977. Between 1971 and 1976, the rate of surgery increased 33 percent or 3.5 times faster than the population growth (National Center for Health Statistics). This has prompted policy makers and third party payers to institute second opinion surgery programs that question the medical necessity of recommended surgery.

Prior to 1975, comparatively little research existed on the market for physician services. The pre-1975 research literature often used CPI data for selected procedures or other comparatively aggregate data. Data on individual physician practices were the possession of the American Medical Association or *Medical Economics Inc.* Neither of these organizations was willing to make these data available to the general public for research purposes.

In 1975, the Division of Health Insurance Studies of the Social Security Administration, the predecessor to Health Care Financing Administration's Office of Research, Demonstrations, and Statistics (ORDS), funded approximately 10 research projects costing over $3 million. The papers in this volume focus on the way physicians are paid by third party payers rather than the size and significance of patient cost-sharing. Together with other research projects from HEW's Health Resources Administration and in-house HCFA research, these 14 papers summarize selected project findings.

Role of Research in Policy Making

Researchers are similar to other occupational groups, in that they believe in their product. Former HCFA Administrator Robert Derzon opened the conference with a quotation from John Maynard Keynes concerning the role of research:

> The ideas of economists and political philosophers both when they are right and when they are wrong are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men who believe themselves to be quite exempt from any intellectual influences are usually the slaves of some defunct economist (Keynes, 1935).

In the closing panel discussion Uwe Reinhardt provided a clever outline for the role of research in policy making:

> Policy is made on the basis of perceptions, and of course, for purely political motives—sometimes very narrow and sometimes very base. But the perceptions that people have when they are making policy are shaped by the available data. In many instances this means anecdotes, and they are shaped by prejudices, of course. I see the role of research as twofold: number one, to enhance to quality of the perceptions that people have . . . to improve the folklore. Secondly, research results can be used to constrain the actions that are taken for purely political purposes. In fact, I view the output of research . . . as similar to the role one ascribes to the generally accepted accounting principles . . . . These principles are written on rubber sheets. They can be stretched considerably, but there's a limit to how much rubber can be stretched.

Many of the conference presentations provided descriptive results that addressed Reinhardt's first research role, "to enhance the quality of the perceptions that people have." Although causal relationships cannot be determined from descriptive statistics, they do serve to document reality and lay the groundwork for subsequent behavioral models. For example, some critics have alleged that the Medicare program pays for physician services at levels far below those of private insurers. Burney and Gabel reported that Medicare payments average at least 92 percent of Blue Shield's "best plan." Other critics have charged that Medicare payment levels in rural and underserved areas are substantially below those levels found in urban areas. Burney and Gabel found that Medicare payment levels in the largest metropolitan areas average 35 percent more than the national Medicare average and Medicare payments in rural counties were nearly 15 percent less than the national average. There have also been suspicions for a number of years that many pathologists and radiologists are earning excessive incomes resulting from lucrative contracts with hospitals. Schaffert *et al.* reviewed records of financial transactions between the hospital and the hospital-based physician groups. They reported that full-time equivalent compensation for hospital-based radiologists and pathologists with a percentage of departmental revenues arrangements with hospitals averaged $124,000 and $138,000, respectively, in 1975.

A second role of research is to develop and test empirically theories that explain and predict how invisible, impersonal forces determine the workings of the market. For the physician services market, these theories must consider the complexitites of third party payment and other competitive restrictions, such as occupational licensure. If the enigmatic ways of the market for physician services can be understood, then incentive systems that financially reward socially desired behavior can be developed. These incentive systems are one public policy alternative to direct government regulation of the marketplace for achieving access, cost, and quality goals.

Lynn Jensen of the American Medical Association was one spokesman for this approach. In his summary remarks, he stated:

> There are some general themes running through most of the presentations . . . . The first is that standard economic tools do have a place in the health economics field . . . . The second is that physicians do respond to economic incentives . . . . There is an important corollary to the concept that physicians respond to economic incentives; that is, if we find we are obtaining socially unacceptable outcomes from our complex health care system, these outcomes may be more due to faulty incentive structures facing physicians, patients, insurance companies, and others than to defects in individual personalities or aberrant behavior . . . The key to obtaining outcomes that are deemed more socially desirable is to create a proper set of incentives.

Yet, just because one responds to economic incentives does not mean that a desired outcome will follow. There may be sound theoretical reasons for doubting that a little tinkering with incentives can create sound market performance and that goals can be achieved without having to pay economic rents to the medical profession.[2]

When one contrasts the structural elements of the physician services market with those of the economists' perfectly competitive ideal, one finds nearly every competitive condition violated. Until recently, aggregate entry levels into medical school have been limited. Competition from related fields has been severely impaired through the use of occupational licensure laws. State legislation has stifled the growth of non-fee-for-service organizational arrangements. The AMA's code of ethics historically has deemed such practices as the publishing of fee information unethical. The presence of third party payments means that those who receive physician services are unlikely to pay for the full cost of those services themselves.

Perhaps no aspect of the physician services market has more violated the competitive paradigm than the issue of consumer information. Neo-classical economics assume that consumers have given preferences and perfect information about the goods and services they wish to purchase. But in the case of the physician services (and for that matter a number of other services), the patient requires professional services primarily because he lacks information. The physician, while acting as the patient's agent, has the dual role of providing both information and services. If the physician selects a bundle of medical care services different than the bundle the perfectly-informed patient would choose, then the agency relationship is incomplete. Under fee-for-service payment, the economic interests of the patient and physician are often conflicting. This may be a major factor leading to a breakdown of the agency relationship. It is alleged that this incomplete agency relationship is the source of the "ultimate market power," the ability to induce demand for one's services.

The agency relationship may be a greater impediment for achieving satisfactory market performance than the elimination of competitive restrictions. Occupations that simultaneously provide information and services are characterized by high rates of inflation, fraud and abuse, and incomes that exceed comparable occupations with equivalent years of training. This appears to be true both for occupations with extensive competitive restrictions, such as lawyers, dentists, and plumbers, and for occupations relatively free of competitive restrictions, such as auto and television repairmen.

The conference papers offer an opportunity to go beyond theoretical discussions of market structure. Some researchers used actual paid claims to investigate price and service patterns of individual physicians under varying conditions of physician scarcity. Of particular interest were the answers to two related questions:

- Is physician pricing monopolistic or competitive?
- Do physicians have the ability to induce demand for their services through increased prices or utilization?

Physician Pricing: Monopolistic or Competitive?

When economists use the term "monopolist" they are referring to the ability to set a price for the product rather than to accept a price determined by outside market forces. If the physician market were competitive, then one would find the physicians of a given specialty within a market area charging identical or nearly identical prices. This pattern was not found when actual paid claims were analyzed. Using 1971 paid claims from two states, Hsaio reported a two to three-fold difference for common medical and surgical procedures within areas. Based upon a sample of 5,000 California solo practitioners, Holahan *et al.* found that variations in physician-billed charges within sub-state areas were greater than variations among specialties and sub-state areas.

Whether or not physicians charge different prices to different patients according to the patient's ability to pay is another issue that furthers one's understanding of the physician services market. Physicians have traditionally regarded such a practice ("price discrimination" in the economist's language) as a demonstration of their altruism. Economists and lawyers often viewed it as evidence of market power, and a means for capturing the "consumer surplus" and thus maximizing earnings. Leaving the merits of these arguments aside, evidence from the conference indicates that price discrimination by physician "list prices" is no longer prevalent. Holahan *et al.* found that individual physicians charge equivalent prices to Medicare assignment patients, Medicare non-assignment patients, and Medicaid patients. Based upon 30 randomly selected Massachusetts physicians and 40 Indiana physicians who performed lens extractions, Hsaio concludes that physicians are not practicing price discrimination. However, in a subsequent section, we will see that a pricing model that suggests that physicians discriminate on the basis of the "transaction price" (one based on the actual revenues collected), yields useful results for explaining physicians' willingness to treat Medicaid and Medicare assignment patients.

In recent years, lawyers and economists have given considerable attention to collusive mechanisms for physicians to set fees. One such mechanism is a relative value system. Hsaio compared predicted charges from a state relative value system (RVS) with actual physician charges. The fit between predicted and actual charges was not close and led Hsaio to conclude, "If organized medicine is trying to fix prices through RVS, it has not been able to do it collectively."

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[2] One indication of monopoly power is persistantly high internal rates of return. The rate of return for medical education was estimated to be 15 percent in 1959 and 22 percent in 1969. By contrast, the rate of return for a college education for men was 11.5 percent in 1969 and 8.5 percent in 1974 (Freeman, 1975; Feldman and Scheffler, 1978).

Supplier Induced Demand: Do Physicians Possess the Ultimate Monopoly Power?

The physician-induced demand controversy is receiving considerable attention in the current health economics literature. Two rival schools of thought have developed. Canadian economist Robert Evans has designated these schools as the "N's" and the "B's". The "N's" (narrow—known formally as "profit-maximization school,") believe that the primary forces behind the consumption of health services are consumer tastes and out-of-pocket costs. The "B's", (broad—known formally as the "extended-utility maximization school") believe that the physician is the dominant force in determining medical care use patterns.[3] The greater the ability of physicians to influence these patterns, the more difficult it will be for society to achieve cost and access goals under fee-for-service systems.

A number of empirical tests have been suggested that would indicate the presence of physician-induced demand:

- Do increased numbers of physicians result in increased numbers of services per capita?
- Do increased numbers of physicians result in higher or lower physician fees?
- How do physicians respond to a revenue system that has been constrained by "government command"?
- Can physicians manipulate third party payment systems so as to induce demand for their services?

Unfortunately, a positive answer to some of these questions is often consistent with both profit maximization and supplier-induced models. For example, as more physicians pour into an area, patient per capita utilization rates increase. While B's would attribute this increase to induced demand, N's might interpret it as resulting from shortened queues and thus a decreased time price of care or satisfying previous excess demand. While B's interpret higher prices associated with increased physician density as evidence of the "ultimate monopoly power," N's attribute this to a backward bending supply curve of quality differences, or "time prices." Indeed, there are so many alternative explanations consistent with both models and capable of explaining identical statistical phenomena, that ultimately researchers may be reduced to resolving the issue with Yogi Berra epistemology—"You can observe a lot by just watching."

With respect to the first research issue, a number of provocative findings were reported which suggested that increased numbers of physicians result in increased numbers of services per capita. Berry *et al.* analyzed paid claims data from the Quebec Universal Health Insurance Plan from 1971 to 1975. During this period, all physician services were paid on the same province-wide fee schedule. The physician-to-population ratio increased by an average compound rate of growth of 7 percent per year. An analysis of beneficiaries indicated that, with other factors held constant, per capita utilization was strongly related to the number of area physicians. However, while the amount of lower priority surgery was positively related to the number of area physicians, the composition of surgery between lower and higher priority cases did not appear related to physician scarcity.

Wennberg *et al.* found substantial variations in per capita surgery rates for hospital areas in Maine, Vermont, and Rhode Island. They reported:

> For the tonsillectomy in Vermont (1969–1971), the probability of removal ranged from 8 percent to 62 percent of resident children, the probability of loss of uterus ranged from 24 percent to 52 percent, for the appendix from 11 to 31 percent.

However, these variations are interpreted as deriving from "intra-professional differences in evaluating illnesses and beliefs . . . ." Why these differences should be highly correlated with physician density still remains an unexplained variation.

Research results on the second question are not so clear. On one hand, Burney and Gabel show cross tabulations indicating that Medicare prevailing charges are higher in physician-rich rather than physician-scarce counties. On the other hand, Mueller and Otelsberg reported conflicting results. Using the 50th percentile of 1976 customary charge distributions and the Medicare carrier as the unit of observation, their reduced form equations indicate that increasing the number of physicians has a statistically significant, depressing effect on price. Unfortunately, some may question their aggregation methods and regression specifications. Based on a sample of 5,000 California physicians' billed charges in 1975, Holahan *et al.* also found that an increased number of area physicians tends to depress price modestly.

Supply-induced demand models attempt to explain how individuals with multiple objectives and unused discretionary market power react to a threatened decline in their standard of living. When governments or third party payers impose severe constraints on revenue, researchers have the opportunity to examine a "quasi-natural experiment." Holahan *et al.* analyzed trends in physician-billed charges, program payments, intensity of services, and quantity of services under the Economic Stabilization Program (ESP) during 1972–1974 and for the year following the expiration of controls, 1974–1975. They reported that the ESP was successful in restraining the growth in physician fees but failed to check the growth in Medicare expenditures for physician services. During the ESP, the volume of services increased by 10 percent per year. Following the expiration of controls, the volume of services declined slightly. Thus, despite double-digit, post-control price increases, Medicare expenditures actually increased faster during control years than during non-control years. The authors were unable to attribute this behavior to either a substitution of Medicare patients for private patients or to physician-induced demand. Some may find it difficult to believe that physicians could so sharply "fine-tune" their mix of patients in such a short period of time. Moreover, ESP controls were enforced more stringently in the Medicare-Medicaid programs than they were by private insurers, who generally left the onus of enforcement to the physicians and their patients.

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[3] One popular variant of the extended utility maximization school is the income-targeting model.

In 1971, under Canada's national health insurance program, Quebec instituted a province-wide fee schedule that constituted payment-in-full. Despite no increases in fees between 1971 and 1975, Berry *et al.* reported that payments for physicians' services increased annually by an average compound rate of 9 percent. These increases in payments may represent either satisfaction of previously unmet demands, physician-induced demand necessary to defend a previous standard of living, or a combination of both. The authors were unable to determine which interpretation was correct.

Third party physician payments under fee-for-service have many institutional complexities. Academic economists' models of the physician sector have tended to ignore these complexities. Procedure coding terminologies and customary, prevailing, reasonable (CPR) payment methodologies may not be Nobel Prize winning subjects, but they may be a source of unused discretionary market power. When physicians find their income level threatened, they may manipulate these institutional mechanisms as a means for increasing their income. For example, there are 16 different types of office visits in the 1969 California Relative Value system. A physician may merely change the name of the visit to a more lucrative type of visit and thereby increase program payments. Although this is not captured in the CPI, such "procedural creep" can be highly inflationary.

A number of conference papers examined the inflationary potential of procedural coding terminology and CPR payments. Holahan *et al.* concluded from an intertemporal analysis of individual physician billings that basing physicians reasonable charges upon past billing does contribute to inflation. They also found that there was a steady increase in the intensity of visits throughout ESP, and that this trend continued after controls expired. Berry *et al.* reported that while the number of visits per Quebec physician declined by approximately 5 percent per year, this was offset by a shift to more intense visits. There was a pronounced movement from ordinary examinations to more expensive complete and major complete examinations. Newman and Lilienkamp documented changes in billing among Virginia physicians when the State converted Medicaid from the Blue Shield code to the AMA's Current Procedure Terminology, 3rd edition. The latter has many greater opportunities for "unpackaging". Their results indicate that for individual types of services (medicine, surgery, pathology, radiology), payments per procedure increased after the conversion.

Second Opinion Surgery: An Application of Supplier Induced Demand Theory

In a field dominated by painful trade offs, second opinion surgery programs offer a rare opportunity to improve both cost and quality of care simultaneously. The mechanism for achieving this is the strengthening of the physician-patient agency relationship. Most second opinion programs prohibit the second or consulting physician from performing surgery on the patient. This eliminates one potential source of conflict between the physician's and the patient's economic goals under fee-for-service payment.

McCarthy and Finkel presented recent findings from an evaluation of the Cornell University Medical College second opinion program for elective surgery. This program included mandatory compliance or voluntary compliance.

Data from the program since 1977 indicated that only 10 to 15 percent of the patients in the voluntary component sought a second opinion for recommended elective surgery. Approximately one-third of the voluntary group and 17.2 percent of the mandatory group were not confirmed for elective surgery by the consulting physician. A telephone follow-up survey completed one year after the date of consultation found that for those not recommended for elective surgery, 79 percent of the voluntary and 64 percent of the mandatory group had not undergone surgery. McCarthy and Finkel reported two additional striking results. First, approximately one-fourth of those patients recommended for elective surgery by the consultant reported that they had not undergone surgery one year later. This suggests that patients may not always follow their agent's advice. The second is the magnitude of the "sentinel effect," the deterrence of surgery that results from surgeons knowing their recommedations will be subject to peer review. Unions in the mandatory program reported declines greater than 10 percent in the number of surgical claims submitted.

Wennberg *et al.* were more skeptical of the cost-saving and quality-enhancing attributes of second opinion programs. They noted that lowering the probability of surgery for an individual is not synonymous with lowering the probability for a group overall. They suggested that surgeons will simply substitute patients not covered by second opinion programs for covered patients. The high percentage of non-confirmed cases is attributed largely to professional as well as consumer uncertainty. Their analysis assumed an excess demand for surgeons' services, an assumption that conflicts with the findings of the 1975 SOSSUS study and conventional wisdom.

Financial Incentives and Physician Participation in Public Programs

The clearest and most robust findings from the conference presentation were on issues dealing with access to care. The conclusion from these studies was that if the public sector were willing to pay a high enough price, then more physicians would serve public patients in their private offices.

Cromwell *et al.* employed a price discrimination model using the transaction price to interpret office-based physicians' willingness to participate in the Medicaid program. Physicians were assumed to rank patients according to their ability to pay, providing care first to patient with the most money, with the rest of the patient load made up of the less wealthy. Using data from a national survey of 2,000 office-based physicians, Cromwell *et al.* estimated that with other factors held constant, a 10 percent increase in Medicaid fees would result in a 7 percent increase in the level of physician participation. Their results also indicated that physicians' willingness to participate is highly sensitive to notorious "red tape," such as payment delays, claim return rates, and complexity of forms. The sensitivity is of such concern that they recommended that the marginal dollar be spent on improving payment efficiencies rather than raising fees.

Holahan *et al.* used a similar price discrimination model to predict California solo practitioners' willingness to treat Medicare assignment and Medicaid patients. Their analysis indicated that the higher the level of physicians charges, the less likely the practitioner is to see Medicare assignment or Medicaid patients. The higher the level of program payments, the more likely the physician is to serve public patients. However, raising program payment levels is likely to trigger higher physician charges. If the increase in physician charges is substantial, the resulting increase in physician participation in public programs may be quite small.

While physician willingness to treat public patients remains a short-run concern for improving access to care, a longer-run issue is the availability of practitioners in urban ghettos and rural areas. In the past two decades there has been a decided trend away from rural based general practice and towards specialized, institutionally urban-based practice. This has further aggravated problems of access. Researchers have been relatively unsuccessful in grappling with the role of economic incentives in determining physician location and specialty choice. However, a number of authors at the conference were able to document the perverse incentive structure of present third party payment systems. As noted previously, Burney and Gabel found that where physicians are scarce, physician charges and payments per service are the lowest. Mueller and Otlesburg showed that with the exception of laboratory and x-ray services, customary charges are generally higher for specialists than for general practitioners. Burney and Gabel reported that the rate of increase in Medicare "allowed charges" between 1968 and 1972 was less for primary care specialties than for other specialties. Roger Platt, of the Albert Einstein College of Medicine, perceptively noted in his closing remarks that the major distortion in present payment systems is the higher "wage rate" to physicians for using their "tools and their hands" rather than their "time and judgement."

Berry *et al.* attempted to tackle the difficult question of the effect of economic incentives on physicians' choice of practice locations. They reported that the level of gross payments per physician in an area exerted a positive effect on the location of Quebec general practitioners. Specialists' location decisions did not show this sensitivity.

Physician Financial Incentives and Rising Hospital Costs

A number of papers examined the relationship between physician incentives and hospital behavior. This is a relationship that has often been omitted in economic models of the hospital industry. The basis for subsequent empirical work was set by Redisch who provided an insightful heuristic model of the hospital sector. Noting that the research and policy communities have been misled by the dual billing system for the hospital and the physician, Redisch states that health care in hospital settings should be viewed as a single product. The physician makes many of the major resource decisions in the hospital. The physician orders diagnostic tests and therapeutic measures, performs surgery, and discharges the patient. Hosptials compete for physicians, not patients. Therefore, in combination with third party reimbursement of hospitals, the successful administrator will fill beds by supplying the medical staff with requested technology, personnel, and supplies.

Using data provided by the American Hospital Association, Redisch shows that approximately one-third of the increased costs of hospital care between 1968 and 1971 can be traced to dramatic increases in the utilization of seven physician-directed ancillary services. He noted three factors that encourage these increases: (1) the "technological imperative" instilled in physicians during medical training; (2) the presence of third-party payments; and (3) the incentive structure that allows physicians to view the hospital as a "rent-free" workshop. Redisch recommended that efforts to control hospital costs be shifted to the physician. He stated: "The greatest potential in utilizing the physician to contain hospital costs may lie in a movement. . .away from fee-for-service. . .and away from a system in which individual physicians control hospital inputs without bearing any responsibility for them."

Markel presented findings from a physician payment experiment that substituted a prospectively determined single payment for inpatient medical care for the current *a la carte* fee-for-service system. The experiment demonstrated the potential for realizing significant savings on hospital costs. Between July 1975 and June 1976, 91 physicians on the staffs of nine Pennsylvania hospitals agreed to accept lump-sum payments for Blue Shield patients on a per case basis. These payments were based upon the disease and not the length of treatment. Markel calculated differences in the length of stay (LOS) between the pre-experimental and experimental time periods for the experimental group. He made the same calculation for a control group, and then compared the changes in LOS for the two groups. Markel reported that the experimental group had over twice as many favorable and statistically significant changes in LOS. The per case payment method was most successful in reducing LOS in low-occupancy hospitals.

Pauly examined the effects of physician characteristics on hospital costs for 50 California hospitals in 1975. Using a single equation regression model, he reported that hospital staff characteristics explain a greater portion of variability in hospital costs than traditional case mix measures. Attempting to hold case mix constant, Pauly found that surgeons and non-medical and surgical specialists tended to depress hospital costs, whereas pediatricians tended to raise hospital costs. He interpreted these surprising results as the consequence of greater concern and caution among hospital-oriented physicians toward the use of hospital resources. It is reasoned that these physicians have a greater financial stake in the efficient operation of the hospital. However, since patients pay out-of-pocket for less than 10 percent of the total cost of hospital care, we find it difficult to see how any physician presently has a significant financial risk in containing hospital costs. Some conference participants suggested that a more plausible explanation was an error-in-variables specification problem that led to an inability to sort out the differences among physician characteristics, case mix, and hospital characteristics.

Based upon a national sample of 120 Arthur Andersen client hospitals, Schaffert *et al.* reported that compensation is often more than double for hospital-based physicians who are paid a percentage of departmental revenues than for salaried physicians in the same specialty. They also documented the size and profitability to the hospital of four ancillary departments (radiology, pathology, anesthesia, and cardiology). These departments and the emergency room accounted for 23 percent of hospital charges and 17 percent of fully-allocated costs. Unfortunately, the absence of standardized measures of output among hospitals prevented Schaffert *et al.* from addressing the important questions concerning hospital-based physician incentives and associated hospital costs in their departments. Future research should determine if paying the hospital-based physician on a percentage or fee-for-service basis rather than salary results in greater quantity and complexity of ancillary department services. Another important research question is whether fee-for-service or percentage payment methods produce efficiencies that yield a lower unit cost of care.

Utilization review is an alternative or complementary method to economic incentives for influencing physician behavior in hospitals. Many economists have been openly skeptical of the success of this regulatory approach, likening it to relying on the "fox to police the chicken coop." Gertman *et al.* discussed findings from a national survey of more than 400 hospitals in 1976. They reported that in 1976, 90 percent of hospitals were performing concurrent extended staff review and that utilization review was well accepted by hospital administrators. Approximately .2 percent of all extended stay reviews resulted in termination of health benefits.

Conclusion

Conferences are traditionally concluded with a call for additional research. The apparent self-interest of researchers in such action often is a source of amusement to persons of "practical means." Contrary to tradition, we shall close this article with a summary of what we have learned, rather than what we haven't.

1. Physician charges and Medicare prevailings are highest where physician density is greatest. Medicare payments for physician services are competitive with other third party payers, whereas Medicaid payments tend to be substantially below those of other payers throughout most of the country.
2. Physicians are price-setters rather than price-takers.
3. Price discrimination of physicians' list prices is no longer prevalent.
4. Physician decisions to participate in Medicaid are highly sensitive to the difference between the physician's billed charge and program payment.
5. An increase in the number of area physicians per capita tends to lead to an increase in per capita utilization, including elective surgery, and the intensity of a physician visit.
6. Controlling physician charges or third party payments per procedure is not synonymous with controlling expenditures for physician services. Physicians have demonstated a capacity to circumvent controls by increasing the volume and intensity of services.
7. A major contributing factor to the rising cost of hospital care has been an explosive increase in the number of diagnostic services ordered by physicians. The demands and use of greater technology are a natural outgrowth of a system whereby physicians make major resource decisions in the hospital but do not bear the financial risk for these decisions.
8. An experiment whereby physicians were paid for inpatient care on a per case basis resulted in reduced lengths of stay.
9. Compensation for hospital-based physicians paid on a percentage of departmental revenues method is more than double that of their salaried peers.
10. Second opinions for surgery have a marked potential for reducing elective surgery rates.

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Welcome

by Robert Derzon

It is a pleasure to welcome you here. As you know, we are a new organization made up of pieces of old organizations. One of the nice features about having a new organization is that you can do some new things.

I think that one of the things that we have been able to do is to assemble a very intriguing group of individuals—a first-rate group of minds. We have been able to pull together into one organization in the Health Care Financing Administration people who are concerned about health and health care financing policy.

Certainly, many of you are deeply interested and involved in one of our primary concerns, physician reimbursement. We have tried to assemble a group of people who were in existing organizations as well as bringing in some new staff. We also have some very competent people working with us while they are on sabbatical.

I believe that one of the most pleasurable parts of my position is working with many of the people who are going to be presenting papers here today. Clif Gaus, Martha Blaxall, Jon Gabel, and others whom you will be hearing from are people that we count on very heavily. What we have tried to do is bridge the research aspects with the practical problems of policy formation.

I want to say a few words about what you're going to be discussing. You in this field know a good deal more about it than I do, but for some time now I have been deeply interested in the questions of physician payment. It seems to me that this has been a "no-no" area of discussion for economists, physician groups, and payment agencies for a long time. In the hospital community, where I came from, there is a feeling that government is only concerned about hospitals and other institutions and is not really concerned about another source of real problems, namely, the physicians.

As you know, 70 percent of health care services are probably generated through the physician and the physician-multiplying factor. What I call the physician multiplier is their ability to generate expenses. At the present time, in the Medicare program alone, we have 240,000 participating physicians. We have close to 300,000 working physicians, when you include residents and interns. In the Medicare and Medicaid programs, there are roughly 7,000 hospitals, 16,000 nursing homes, and a cadre of pharmacies, labs, suppliers of medical equipment, etc.

There is a great deal of concern about the method that Medicare has been using to pay physicians—the customary prevailing and reasonable. Those catch words, which you are going to be talking about, dominate the payment mechanism at the present time. Most of us who have not been working with that system for a long time have trouble understanding it. Physicians who have been paid under this system since 1967 have a great deal of trouble understanding it. Each year, 4,000,000 beneficiaries of the Medicare program alone make inquiries about the program's benefits and their eligibility, and a substantial percentage of those inquiries concern what the physician or patient was paid or wasn't paid.

Payment is a source of enormous administrative activity. It is also a source of enormous confusion. Some of us think that these problems have to do with difficulties in assignment rates and some of us feel that the Medicare payment system has led to substantially greater inflation than would have happened had we found some other way. I'm not sure about that, but it certainly has reinforced the problems. There are a number of problems with the customary, prevailing and reasonable payment method, and I hope that you will examine that issue during this conference and begin to think about what the options are.

There are, of course, a number of other facets. I am not going to talk about all of them. It is enough to say that we are spending substantial sums of money on physician services at the present time. In the Medicare program over the last few years, there has been roughly a 20 percent increase in aggregated expenditures for physicians. In Medicaid, there was first a 16 percent and then a 20 percent aggregate increase for physician costs in the last two years.

Physicians are quick to point out that this is not the predominant expenditure. However, when you take 140 billion dollars of current health expenditures and look at the roughly 20 percent devoted to doctor services, it is not an inconsequential amount of money. It never was, and it certainly is not today. How to control that expenditure or reduce it or accelerate it selectively has a great impact upon the decisions young physicians make in terms of specialty choice and professional career.

Physician services are not as well covered with respect to reimbursement as some institutional services. Therefore, there are more out-of-pocket costs and more financing problems in caring for the poor.

One of the conferences held earlier this year by Medicaid was devoted to the problem of physician participation in the Medicaid program. This is a serious problem in some states. In many states, of course, they are using fee schedules. Some of those fee schedules are substantially discounted. This is one method that Medicaid administrators seem to be using to control costs, which is essentially an appropriation system to pay for Medicaid services.

One of the issues that I hope will be examined in this conference is the question of use of physician services. There is some interesting work going on. Mark Blumberg sent me a compendium of current work being done by him and by some of you. I was intrigued by some of the findings with respect to use. Most of us, of course, are familiar with data that show that there are substantial variations in group practices, HMOs and other ways of providing services. There are substantial differences in physician use in those programs, compared to more conventional fee-for-service programs.

There are also substantial regional variations in physician services. When I was in Atlanta, the Blue Shield Director there told me that they were doing 120 surgical procedures per 1,000 subscribers versus 60 in New Jersey where there is, essentially, a comparable population. Those differences are difficult for us to explain, and they make paying for those services in high utilization areas more questionable. What can be done about this situation

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without making significant changes in the structural system of payment of physicians is, of course, a matter of concern to us. In the Institute of Medicine study that Martha Blaxall, I, and others here worked on, we found substantial differences in payments for identical services in various parts of the country, with high rates almost in direct proportion to high supply of physicians. That is not a new finding to any of you, but it is one that perplexes me as I look at the numbers of physicians in the "pipeline" and where they are going to settle down.

Keynes said in 1935, "The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else. The practical men who believe themselves to be quite exempt from any intellectual influences are usually the slaves of some defunct economist. Mad men in authority who hear voices in the air are distilling their frenzy from some academic scribbler of a few years back."

I think that is probably true. But, I am not so sure about the last part of that statement. Keynes goes on to say, "The power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas." I have to point out to you that in the process of policy making, there are many compromises. And the longer I am in Washington, the more sensitive I am to the extreme power that special interests do have. In a sense, they may have employed the best economists of all.

Reimbursement Patterns Under Medicare and Medicaid

by Ira Burney and Jon Gabel

Introduction

Few areas have greater potential for increasing efficiency in the health care system than improving the system for paying physicians. While expenditures for physician services account for only about 19 percent of health care spending, the physician is the central decision-maker who determines use patterns for an estimated 70 percent of all health services. Thus the incentives contained in physician payment systems can influence access, cost, and the quality of services in the entire health care system. This paper uses data from two national surveys to describe the patterns of physician payments under Medicare and Medicaid and how they may affect beneficiary access and physician distribution.

The Medicare and Medicaid programs represent quite different approaches to financing health care. Medicare is similar to a uniform national private health insurance plan, while Medicaid is state-run and based on welfare principles. The reimbursement philosophies of Medicare and Medicaid reflect these differences: Medicare was designed to reflect the private market while Medicaid delegated States considerable flexability and discretion. Despite these differences, both Medicare and Medicaid operate almost exclusively through the fee-for-service system.

Under the fee-for-service system there are two major methods used by third parties for determining how much to pay physicians. These two methods are (1) fee schedules and (2) the customary, prevailing, and reasonable charges, known as CPR. Fee schedules are used by about half of the Medicaid States, for less than half of the Blue Shield enrollees and by many commercial insurers. Fee schedules specify a maximum dollar amount that the insurer will reimburse for the procedure. The customary, prevailing, and reasonable charge method (also known as usual, customary, and reasonable charges—UCR), is uniquely American. Medicare, half of the Medicaid States, more than half of Blue Shield enrollees, and the larger commercial insurers employ this method. Under CPR, the reimbursement rate, known as the reasonable charge, is the lowest of the physician's actual billed charge for that procedure, the physician's customary charge for that service, and the prevailing charge in the local geographic area. While there are precise statistical definitions, the customary charge is supposed to represent what that individual physician usually charges, and the prevailing charge is designed to represent the charge generally made by most physicians in the area. Thus, one way to think about CPR is as a dual fee schedule—one unique to the individual physician and the other tailored to the general charges of all physicians in a local area.

In addition to varying payment methods, differences between Medicare and Medicaid exist in the way payment is made. Medicare contracts with 47 private insurance companies, known as carriers, while about three-fifths of the States use fiscal agents in some capacity. While Medicare establishes uniform rules in implementing CPR reimbursement, the carriers have discretion over numerous operational decisions. For example, in 1975, all but seven carriers had separate reimbursement screens for general practitioners and specialists, and they divided the country into nearly 300 reimbursement areas, known as reasonable charge localities. In contrast, under Medicaid, half the States have separate reimbursement rates for specialists, and two-thirds of the States use Statewide areas, while the others generally use the Medicare definition of localities.

Results

In 1975, HEW surveyed the nation's Medicare carriers and State Medicaid agencies requesting data on prevailing charges or maximum allowable fees for frequent and expensive procedures. The data were requested for each reimbursement locality and for both general practitioners and the specialists who performed the procedure most commonly. Twenty-nine procedures were common to both surveys. Based upon a national "basket" of Medicare goods, we constructed three kinds of fee indices for each county. The first fee index compares local Medicare fees to a national Medicare average of 100; the second compares local Medicare fees to a national Medicaid average of 100; and the third compares local Medicaid fees to local Medicare fees.

Table 1 shows average fee indices for SMSAs (Standard Metropolitan Statistical Areas) and non-SMSA counties from the least to most populated county groupings. The data show a gradient of Medicare fees increasing with county size. For example, Medicare fees in the largest SMSAs (New York, Chicago and Los Angeles) are 35 percent more than the national average, while fees are eight percent less than the national average in the smallest counties. In contrast, since the majority of states use Statewide reimbursement areas, there is virtually no relation between fees and county size under Medicaid.

To parcel out the effects of differences in input prices facing physicians, we adjusted the fee indices of each county for cost-of-living differences (a proxy for factor prices). (See IOM, 1976, for methodology.) Although these adjusted fee indices (Table 1) show that cost-of-living factors account for some of the Medicare fee differences, price differences still remain. For example, Medicare fees in the largest SMSAs average 17 percent greater than the national average but eight percent less than the national average in the least populated counties. Because there was little fee variation before adjustment, Medicaid fees are inversely related to county population after adjustment.

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Table 1
Medicare and Medicaid Specialist Fee Indices in SMSAs and Non-Metropolitan Counties, 1975

SMSA/Non-SMSA Population	Unadjusted Fee Indices			Adjusted Fee Indices	
	Medicare	Medicaid	Medicaid/Medicare	Medicare	Medicaid
All Counties	100	100	77	100	100
Counties in SMSAs					
SMSAs over 5 million	135	96	56	117	86
SMSAs 3–5 million	104	90	65	94	81
SMSAs 2–3 million	105	97	70	103	95
SMSAs 1–2 million	103	105	77	102	104
SMSAs .5–1 million	100	103	77	101	105
SMSAs .25–.5 million	96	104	80	97	105
SMSAs under .25 million	89	102	85	93	107
Non-Metropolitan Counties					
Counties>50,000	88	96	82	96	105
Counties 25,000–50,000	83	100	91	92	111
Counties 10,000–24,999	82	102	93	92	114
Counties<10,000	82	103	92	92	114

Table 2
Medicare and Medicaid Specialist Fee Indices By County Physician to Population Ratio, 1975

County Physicians Per 100,000 Pop.	Number of Counties	Medicare	Medicaid	Medicaid/Medicare
All counties	3074	100	100	77
Less than 36	701	85	107	94
37 to 52	641	83	100	90
53 to 69	586	85	99	88
70 to 102	627	91	99	82
Greater than 103	519	106	99	72

Table 1 also shows that, nationally, Medicaid fees average 77 percent of Medicare fees for specialists. In addition, the data show that Medicaid fees are, on the average, most competitive with Medicare fees in rural counties, but are generally least competitive with Medicare fees in the most populous counties. For example, Medicaid fees average 92 percent of Medicare fees in the smallest counties but only 50 percent in the three largest SMSAs.

Table 2 show average fee indices for quintile groupings of county physician-to-physician population ratios. The data show that Medicare fees are generally higher in the counties with a large number of physicians per capita. Medicare prevailing charges in counties with more than 103 physicians per 100,000 population exceeded those in counties with less than 36 physicians per 100,000 by 25 percent. Medicaid fees exhibit the reverse pattern. Similarly, the Medicaid/Medicare fee index indicates that Medicaid fees are, on the average, least competitive with Medicare fees in areas with many physicians where they average 72 percent of Medicare fees. They are most competitive in counties with fewer physicians where Medicaid payments average 94 percent of Medicare.

A few comments about these results are in order. First, part of the explanation of the Medicaid distribution is quite simple. Two-thirds of the States have no intra-State fee variation. Second, a caution about inferences concerning access to care for low income persons is in order. Medicaid benefit package restrictions and eligibility limitations may also have significant effects. States have discretion to limit the "amount, duration and scope" of services or to define income eligibility ceiling to exclude numerous poor persons from Medicaid benefits. For example, many of the rural southern states where Medicaid fees are most competitive with Medicare often restrict services to one physician visit per month or have restrictive eligibility standards. Thus, for access to care for low income persons, a three pronged policy simultaneously considering benefits, eligibility, and reimbursement may be necessary.

Table 3
Mean Usual Fees and Insurer Fee Schedules

Procedure	Usual Fee	Insurer: Blue Shield's "Best Schedule"	Insurer: Medicare's Usual Payment	Insurer: Medicaid's Fee Schedule
Follow-up visit in the hospital on the day after a patient is admitted	$13.93	$10.73	$10.00	$7.63
Routine follow-up visit in the office	11.59	9.22	8.79	7.20
Inguinal hernia repair	303.97	244.82	233.21	170.57
Diagnostic D and C	149.06	113.97	104.43	76.72
Complete blood count	8.04	7.79	6.17	5.63
Suture of a simple laceration	22.26	19.04	16.55	13.68
Electrocardiogram	19.66	17.05	15.76	13.47

Reproduced from: F. Sloan, J. Cromwell and J. Mitchell, *A Study of Administrative Costs in Physicians' Offices and Medicaid Participation,* Abt Associates, 1977

Up to this point we have assumed that since Medicare reimbursement policy was designed to pay the "going rate," Medicare fees are competitive with those of other third parties. The most comprehensive evidence comparing reimbursement levels for the public programs with those of private insurers comes from the national survey of 2,000 physicians conducted by Sloan *et al.* under contract with the Health Care Financing Administration. Physicians were asked to report their usual fee and the reimbursement rate they usually receive from Medicare, Medicaid, and the "best" Blue Shield plan for seven specific medical procedures (Table 3).

For the follow-up office visit-a fairly good indicator of access to care-Medicare and Blue Shield fees are quite close (the best Blue Shield fees average five percent greater than Medicare). Similarly, for four of the other six procedures, Medicare fees average at least 92 percent of the best Blue Shield plan. Both Medicare and Blue Shield fees average 75 to 80 percent of what physicians report they usually charge—the so-called "list" price. The implication is that, measured by reimbursement levels (and excluding coinsurance differences), Medicare patients are on about the same footing as patients insured by Blue Shield in seeking medical care.

Between 1968 and 1972, HEW maintained a computerized file for five percent of Medicare claims. Table 4 shows that between these two periods, Medicare mean allowed charges increased at greater rates for the more technically oriented specialties. Reimbursement rates for the primary care specialties—general practice and internal medicine—increased at slower rates than those for general surgeons and the surgical specialties. Similarly, Table 5 shows summary comparisons of statistically significant differences in mean Medicare general practitioners and specialists' fees from Schieber *et. al.* The data show statistically significant differences for 27 to 39 procedures, though these differences were generally less than 10 percent. Moreover, of the procedures with statisically significant differences, the types of services with higher specialist than general practitioner fees were medical visits and surgery which represent about three-quarters of Medicare reimbursements.

It is difficult to assess the effect of these differences on physician specialty decisions. A skeptic may find that an absolute difference of 3½ percent in the annual rate of increase in Medicare mean allowed charges between surgeons and internists is insignificant in influencing specialty choices. An elaborate behavioral model using fees and other relevant variables will be necessary to assess the magnitude of these effects.

Table 4
Rate of Change in Medicare Mean Allowed Charges in Selected Specialties, 1968–1972

Specialty	Four Year Change (in percent)	Annual Rate of Change (in percent)
All specialties	23	5.3
Orthopedic surgery	41	9.0
Anesthesiology	39	8.6
General surgery	35	7.8
Ophthalmology	24	5.5
Other specialties	19	4.4
Urology	18	4.2
Internal medicine	18	4.2
General practice	13	3.1
Radiology	11	2.6

Table 5
Summary of Statistically Significant Differences Between Mean General Practitioner and Specialist Fees, 1975

Type of service	Number of Procedures	Number of procedures with statistically significant differences: Total	Number of procedures with statistically significant differences: Cases where mean specialist fee is greater than general practitioner fee
All services	39	27	19
Medical visits	4	4	4
Surgery	18	12	12
Radiology	6	2	1
Laboratory	11	9	2

Conclusion

There is a need to understand what factors account for the Medicare fee differences in areas with more physicians per capita, in larger SMSAs (even after adjusting for cost of living), and among specialties. Similarly, there is a need to understand what effects these differences have on physician behavior and what effects changes in the fees would have on physician behavior. For example, Redisch *et. al.* recently found that physicians in physician-rich areas have 39 percent fewer patient visits per week, although they work nearly equivalent hours to their peers in counties which have fewer physicians. While there may be quality differences in patient visits among these areas, Medicare and similar third party payers may be tacitly reinforcing alternative styles of physician practice. A final factor to bear in mind is that Medicare and Medicaid represent a lever on only one-fifth of the system. The implications of policy changes using the Federal programs alone must be considered, since key lessons from prior tinkering with Medicare and Medcaid alone indicate that adverse consequences for beneficiaries of these programs could result.

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Patterns of Physicians' Charges: Implications for Policy

by William Hsiao

Physicians' prices have gained national attention over the past decade. Physicians' fees are a major factor in determining the total cost of medical services. The rapid rate of inflation in fees has resulted in a larger share of our Gross National Product being spent on physicians' services. More importantly, price is the key economic variable that may determine the supply of doctors and may also influence physicians in their choices of specialty and geographic location.

Yet little is known about the actual patterns of physicians' fees. This question has received little attention in academic circles. Most empirical studies in health economics have examined the average fees and average rate of inflation in fees. While these aggregate measurements are adequate for econometric studies, they cannot provide answers to certain important public policy questions. Among those questions are: (1) Do physicians follow a relative value schedule? (2) What is the economic impact of paying physicians on a fee schedule? (3) Do general practitioners and specialists charge different fees for the same services? (4) Do physicians use price discrimination, in other words, charge according to patients' ability to pay?

As a part of a larger statistical study, we have examined the patterns of fees charged by physicians. This microstudy gives us more complete knowledge about the economic aspects of physician services. Moreover, the analysis enables us to provide some empirical answers to the four policy questions stated above.

Data Base

In any given year, more than one billion visits take place between physicians and their patients. Each visit, except those visits under pre-paid group practice plans, results in a fee being charged for the service.

The volume of the data available for this study was staggering. The records of insurance carriers in twenty-four States were used to determine the actual charges made by physicians. These insurance carriers maintain the most comprehensive set of computer records of the fees charged in their State because their insurance covered a majority of the people in that State or because they were carriers for the Medicare program. The data tapes included information about the procedure performed, where it was done, the specialty of the doctor, the fees charged, and the amount paid by the insurance carrier. The twenty-four States that we selected included all regions of the United States. Among the urban areas included in our sample were New York City, Chicago, Massachusetts, and Indiana. Among the rural areas included were Idaho, Vermont, Louisiana, Oregon, and New Mexico.

The claims records represented the services provided between January 1971 and December 1971. There was an important reason for selecting the 1971 data for our study. This was the latest period of time when data was not affected by the severe disturbance in the marketplace because of the Economic Stabilization Program. Between 1972 and 1974, the rate of increase in physicians fees was controlled by the government. After physicians' fees were decontrolled in 1974, the rate of increase in fees accelerated. Also physicians changed their fees more frequently. It is plausible that the recent inflation of fees was the result of a market in a disequilibrium state. Therefore, the pattern of physicians' fees could be distorted. We were interested in studying the patterns of fees when the market was relatively stable.

Profile of Physicians' Fees

Fees varied widely in a community (or a catchment area) for a given procedure. The range was greater for medical procedures than for surgical procedures. It was typical to observe a two- to threefold difference in charges among physicians for the most common medical procedure—a routine office visit. This difference is illustrated in Figures 1a and 1b for two States. One reason for this wide difference could be the lack of precision in the definition of medical procedures.

For surgical procedures, the variations in fees were less pronounced than for medical procedures. Typical distributions showed less than a twofold difference. It is interesting to note that fees for a routine birth had a higher distribution than other surgical procedures. This is shown in Figures 1c and 1d. Perhaps the reason for this tighter distribution was because patients "shop around." The length of pregnancy gave time for parents to search for an appropriate physician. For some patients, price may have been a factor in the selection of an obstetrician. This could have imposed some market discipline which resulted in a narrower difference in fees. This market discipline could have been further reinforced due to multiple pregnancies where mothers have repeated return visits. Obviously, repeated visits for multiple pregnancies usually do not

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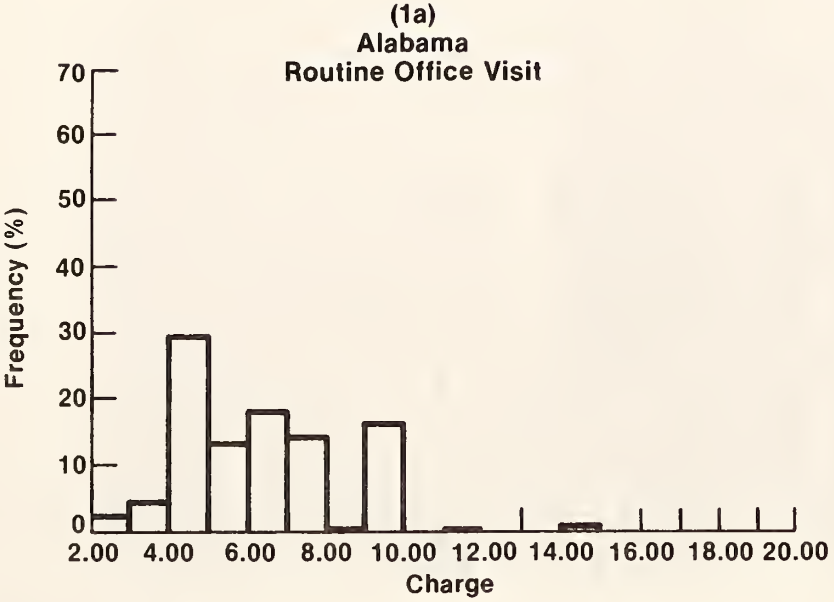
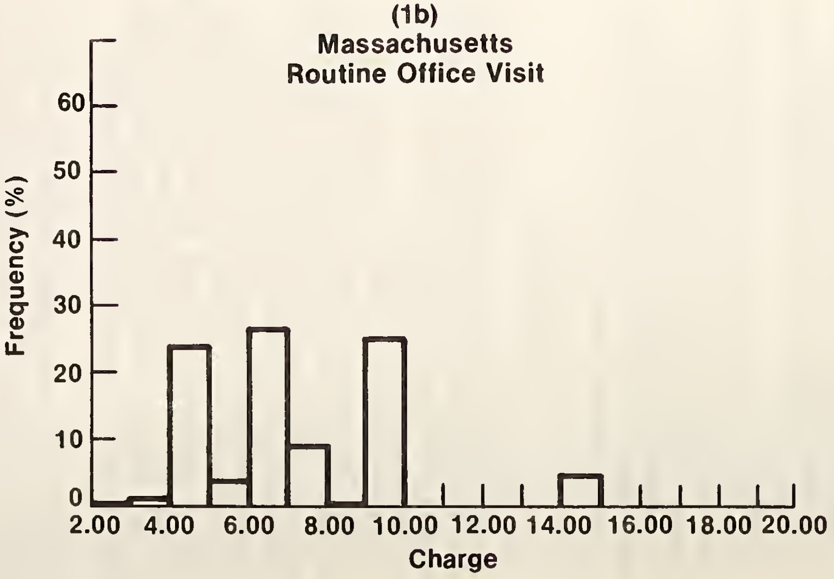
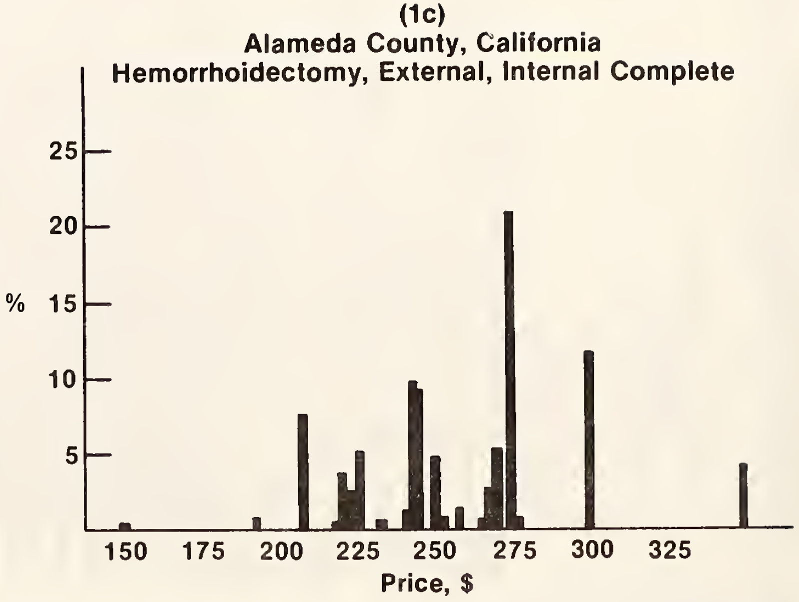
Figure 1



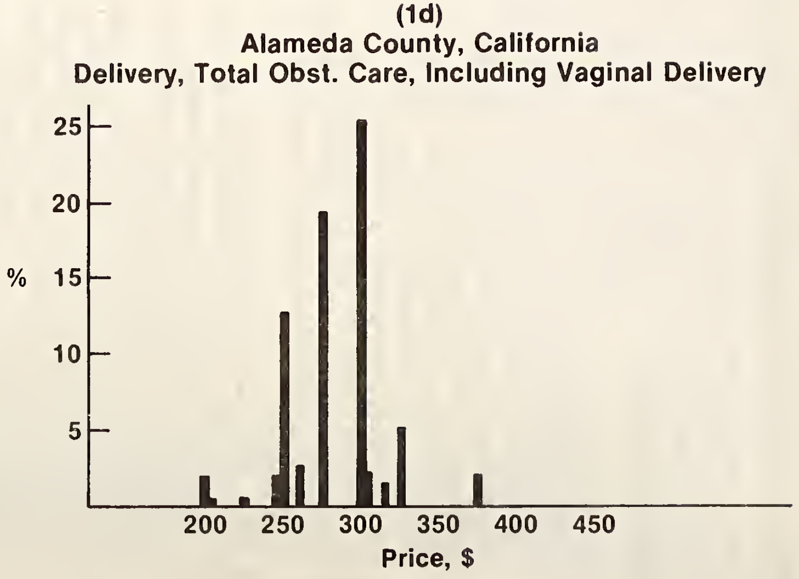
(1a)
Alabama
Routine Office Visit



(1b)
Massachusetts
Routine Office Visit



(1c)
Alameda County, California
Hemorrhoidectomy, External, Internal Complete



(1d)
Alameda County, California
Delivery, Total Obst. Care, Including Vaginal Delivery

apply to other surgical procedures.

The dispersions of fees were not normally distributed for other surgical procedures. There was no statistical distribution that could provide a consistent representation of the dispersion of fees. For the surgical procedures, the distributions of fees in many States tended to be tri-modal, as shown in Figures 1c and 1d.

There was one significant difference in the distribution of fees between medical and surgical procedures. For the common medical procedures such as the routine office visit, the fees tended to be skewed to the left. In other words, more charges were concentrated in the lower price range, and fewer doctors charged in the higher price range. Meanwhile, the opposite was true for surgical procedures. Surgical charges tended to be skewed to the right. A greater proportion of physicians were charging in higher price ranges. Figure 2 illustrates the difference in the skewness of the distributions between medical and surgical procedures.

Policy Implications

In recent years, much attention has been paid to whether physicians set their fees in some collective manner. The Federal Trade Commission, among other government agencies, is investigating the promulgation of relative value schedules (RVS) by medical societies and Blue Shield plans. RVS can only influence the price of various medical/surgical procedures. Individual physicians select their own conversion factors for a relative value unit and thus determine the absolute level of fees they charge. Therefore, one could postulate that there is price-fixing when the RVS is arbitrarily determined by a small group of doctors and they can somehow force most doctors to use it. We can then test the validity of this hypothesis by examining whether doctors are adhering to the RVS. On the other hand, one can postulate (and indeed many claim it is the case with the California Relative Value Schedule) that the RVS is derived from the actual prices charged by doctors. Therefore one would expect a close adherence to the RVS by the average doctor.

We used our micro-price data and statistically fitted them to the RVS schedule that is promulgated by that State. The typical result is shown in Figure 3. In most States, the actual fees did not seem to follow the RVS. We used various statistical methods in fitting the actual fees to the RVS, and arrived at the same conclusion. Physicians did not charge consistently according to the RVS. Two preliminary conclusions can be drawn from this empirical finding. First, the RVS cannot be derived completely from actual market prices. Otherwise we would have found a very close fit between the RVS and actual charges. Second, if organized medicine was trying to fix prices through RVS, it has not been able to do so effectively.

One frequently-mentioned policy option to contain price inflation is reimbursing physicians based on a fee schedule. As shown in the previous section of this discussion, physicians' fees were dispersed over a wide range. If a fee schedule approach is closely followed, the reimbursable amount for each procedure is likely to be established at a level that would be acceptable to the vast majority of physicians. In our study, we selected two hypothetical levels—the average fees and the seventy-fifth percentile—to analyze the economic impacts of a policy using fee schedules. When a fee schedule is established, those physicians who are currently charging lower prices will be paid more. Meanwhile, those physicians who charge more than the fee schedule will receive less than their charges. However, if these doctors are allowed to bill patients for the difference between their charges and the fee schedule, a part of the financial burden would be passed on to the patients. If doctors are not allowed to bill patients for the difference, a change in billing practices, such as fragmentation of services and a shift in the designation of services performed, might be expected.

Table 1 compares the budget outlay for reimbursing doctors according to their charges and paying physicians according to a fee schedule at the 50th percentile and the 75th percentile respectively. The numbers in Table 1 show the percentage increase or decrease in total payment between a fee schedule reimbursement scheme and paying the actual charges.

For a medical procedure, the routine office visit, a fee schedule established at the 50th percentile would reduce budget outlays. If the fee schedule is set at the 75th percentile, there would be increases between five percent and 25 percent in total payments, allowing for State variation. The surgical procedure, hernia repair, shows less reduction at the 50th percentile and larger increases if the fee schedule is set at the 75th percentile.

An unresolved controversy in physician reimbursement policy is whether there should be a different fee paid to general practitioners versus specialists for performing the same procedure. On one hand, specialists require longer training; therefore it is argued that they should be paid more for performing the same service. On the other hand, some argue that length of training per se should not produce variation in fees. But a patient's subjective valuation (willingness to pay) of a medical service should determine the fees. If length of training affects quality of care to the extent that patients perceive a difference, then the fees might reflect this value difference.

Market prices may provide some information which can be useful in resolving this policy question. We tabulated these charges for various procedures by specialty. The results are shown in Table 2. In almost every State, there was no significant difference in the fees charged by general practitioners and general surgeons for routine office visits. However, for surgical operations, general practitioners consistently charged less than surgeons. On the average, general practitioners charge 10 to 20 percent less.

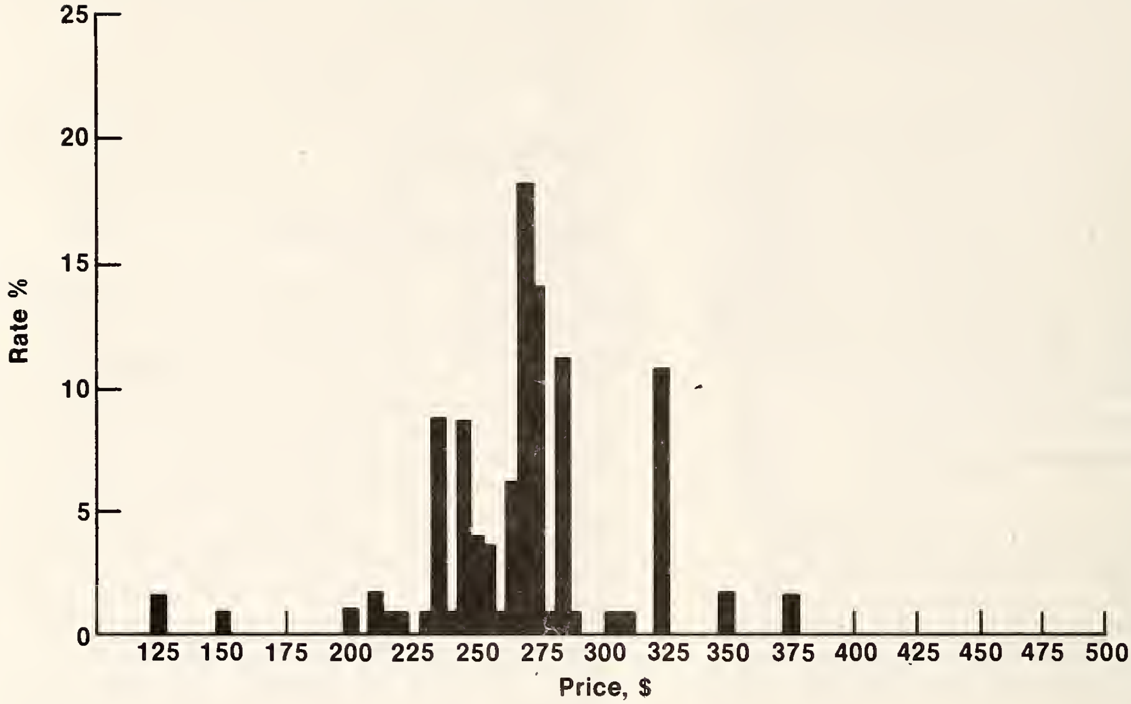
These empirical results tend to indicate the role of patients in constraining the physicians' ability to charge fees according to length of professional training. Surgeons are not able to charge higher fees simply because they have had longer training; the patients' willingness to pay acts as a constraining factor.

It has been the common practice for each physician to charge different fees for the same procedure. The fee varies according to the patient's ability to pay. The customary fee is charged only to those patients who have the financial means to pay. Therefore, if physicians are practicing price discrimination, a government program that sets the fee at the customary level may generate a large windfall gain for doctors.

For our study, we selected a procedure which has a great uniformity of time and work to analyze whether physicians practice price discrimination. The procedure has a reasonably precise definition and relatively few complications arise from it. A random selection of 30 physicians was taken from Massachusetts and another 40 from Indiana. These doctors had performed at least five unilateral lens extractions in 1971. The fees charged by each physician in Massachusetts are shown in Table 3. Results for Indiana are not shown because they are very similar to the results of Massachusetts.

Figure 2

3380 San Diego Hemorrhoidectomy, External, Internal Complete



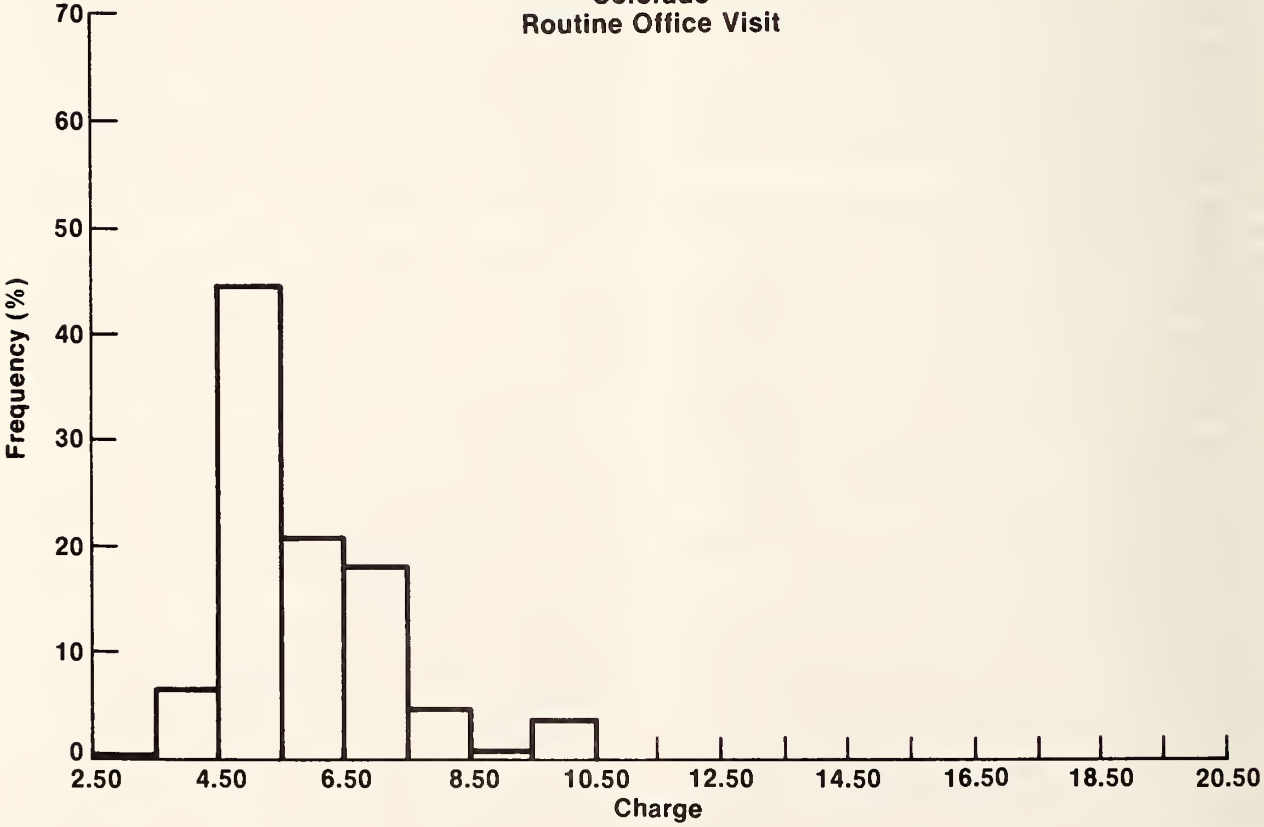
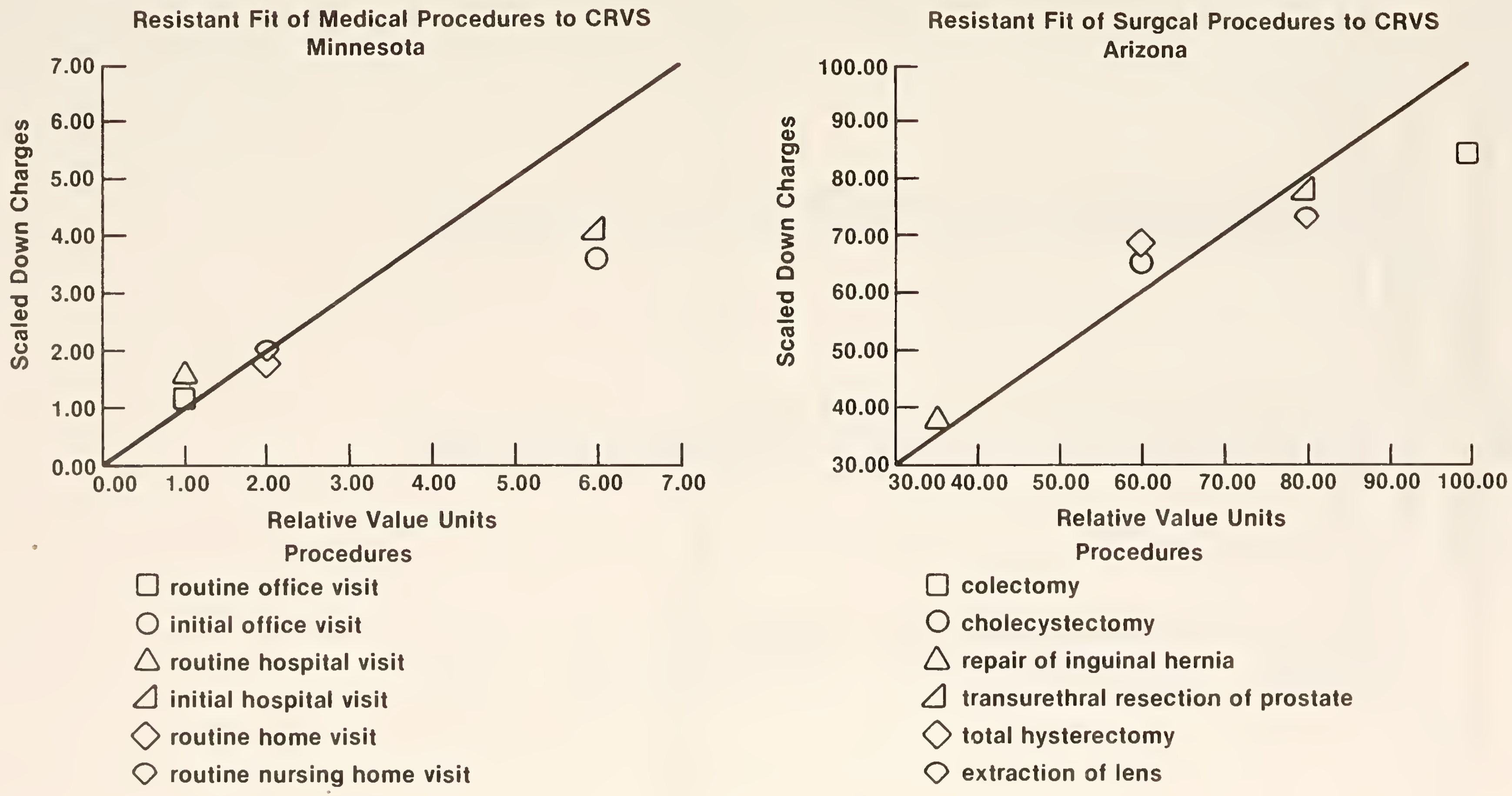

Colorado
Routine Office Visit

Figure 3



Resistant Fit of Medical Procedures to CRVS
Minnesota

Resistant Fit of Surgcal Procedures to CRVS
Arizona

Table 1
Difference Between Actual Charges and Hypothetical Fee Schedules Set at 50th or 75th Percentile

	Change in Total Payment Over Actual Charges (in percent)			
	Medical Procedure[1]		Surgical Procedure[1]	
State	50th	75th	50th	75th
Alabama	−4	19	−4	8
Arizona	−5	16	0	9
Colorado	−6	15	4	4
Idaho	0	8	−4	8
Illinois	−3	14	4	13
Indiana	−1	9	0	13
Kansas	−6	21	−9	3
Louisiana	8	8	−5	6
Massachusetts	−7	26	−8	15
Minnesota	−10	6	−5	6
Mississippi	−11	6	4	4
Nevada	−3	11	−3	5
New Hampshire	−6	—	2	2
New Mexico	5	12	0	0
New York	−17	11	−12	19
North Carolina	−6	10	−10	12
Oklahoma	−12	5	−6	6
Oregon	−3	4	1	1
South Dakota	−4	11	−3	11
Tennessee	−9	6	−4	8
Texas	−20	13	−10	13
Vermont	−10	13	5	5
Virginia	−9	17	−1	12
Wyoming	2	11	9	9

[1] Medical procedure represented by routine office visit and surgical procedure represented by repair of inguinal hernia.

Table 2
Comparison of Fees by Specialty

	Routine Office Visit		Inguinal Hernia	
State	General Practice	General Surgery	General Practice	General Surgery
Alabama	$5.51 (1.48)	$5.60 (1.76)	$193 (52.77)	$214 (50.30)
Arizona	7.35 (1.04)	7.56 (1.44)	233 (33.23)	255 (31.18)
Colorado	5.36 (0.81)	5.36 (1.01)		
Idaho	6.04 (0.89)	6.33 (1.25)	189 (28.75)	223 (49.81)
Illinois	7.15 (2.30)	8.00 (2.71)	272 (75.79)	293 (75.23)
Indiana	6.46 (1.95)	5.67 (1.59)	186 (56.30)	204 (42.50)
Louisiana	5.62 (1.14)	5.88 (1.21)	209 (54.92)	243 (66.88)
Minnesota	6.23 (2.88)	5.97 (1.11)	190 (37.11)	214 (48.26)
Mississippi	5.29 (1.59)	5.26 (0.95)	188 (45.21)	193 (50.82)
Nevada	7.94 (1.46)	8.07 (1.30)	289 (46.44)	316 (27.57)
New Hampshire	7.30 (4.23)	6.72 (3.11)		
New Mexico	5.92 (1.26)	6.67 (1.15)	207 (48.31)	230 (39.28)
North Carolina	5.24 (0.76)	6.33 (1.60)	187 (58.82)	224 (61.33)
Oklahoma	5.35 (0.71)	5.68 (1.00)	190 (33.88)	224 (42.41)
Oregon	6.47 (0.76)	6.79 (0.77)	213 (11.18)	217 (52.32)
Tennessee	5.11 (1.19)	5.79 (1.82)	184 (42.19)	213 (46.12)
Texas	5.68 (1.46)	5.21 (1.07)	197 (60.89)	233 (67.14)
Vermont	6.09 (2.58)	5.76 (2.20)		
Virginia	6.04 (1.40)	5.73 (1.27)	159 (88.07)	203 (52.27)
Wyoming	5.47 (1.39)	5.34 (1.28)	173 (33.50)	193 (37.56)

Table 3
Procedure — Extraction of Lens
Distribution of Charges for 30 Randomly Chosen Physicians in Massachusetts

Physician	Charge	Frequency
1	500	5
2	500	14
3	500	48
4	400	49
5	450	27
	500	25
6	400	17
	500	9
7	500	10
8	500	6
9	500	24
10	500	48
	550	1
11	500	8
12	400	1
	500	13
13	400	9
	500	4
14	500	22
15	400	31
16	400	12
17	500	8
18	350	4
	500	1
19	400	38
20	400	6
	450	4
21	500	7
22	500	55
23	400	1
	500	7
24	490	1
	500	10
25	400	81
26	500	190
27	500	66
	750	7
28	500	45
29	400	1
	450	24
	500	6
	550	3
	555	1
	560	1
	565	1
	600	1
30	500	5

Twenty out of 30 doctors in the sample charged one fixed fee for a lens extraction. A few (5) charged a fixed price for all but one service, while the remaining 5 doctors charged various prices.

Another statistical study to evaluate price discrimination was conducted by calculating $\hat{\sigma}_w^2$, the estimate of within-physician variance. If $\hat{\sigma}_w^2$ is close to zero or very small, it means most physicians charge one fixed price or a very tight distribution of charges for a given procedure. If $\hat{\sigma}_w^2$ is large, then further studies are necessary to ascertain the reasons behind the variation in fees charged by one physician. We found that the values of $\hat{\sigma}_w^2$ are zero or small for most States. They indicated that if there is price discrimination, it is not widespread. The values of $\hat{\sigma}_w^2$ were consistent with the tabulation of physicians' charges for a sample of physicians in Massachusetts.

Our conclusion, based on these two analyses, is that physicians are not commonly practicing price discrimination. A recent survey conducted by Abt Associates, Inc. indicates that doctors were unable to collect a significant portion of their bills. Also, doctors reduced their bills, *ex post facto*, after patients ask for reductions because they were unable to pay. While doctors may not practice price discrimination, they can increase their income by a significant amount, (an average of 11 percent) if a government financing program guaranteed them the full payment of their customary charges.

Questions and Answers

Question: These data which you are presenting here represent data from the carriers in the 24 selected States. Is that just for the Medicare portion of their business or does it include their private business also?

William Hsaio: These are the data used in the fee profiles and, for a majority of the States, the data represent both their Medicare and private business.

Question: Have you done any analyses on physicians who charge for lab tests separately or include them in the office visit fee? Have you done any analyses on whether physicians include the pre- and post-operative visits in the fee or bill separately for those visits?

William Hsaio: We don't know whether pre- and post-operative care are included. We visited Blue Shield and the commercial companies in another part of our study and are getting that information, but we have not integrated that part of the information here.

Question: An observation in Figure 3 of your paper is that the procedures below the curve are primarily procedures done for the elderly. What would happen if you weighted the data by the age of the patients?

Answer: We have not done that. Please elaborate on why you think that is important.

Comment: I wonder if physicians are reducing charges to the aged as compared to younger adults.

William Hsaio: I never heard that hypothesis before, but it is interesting to look at. I never heard the suggestion that doctors actually reduce fees for the Medicare patients for the same procedure.

Comment: We now have the conclusion from a number of studies that price discrimination in list prices, of the sort that appeared in Samuelson, no longer exists. A study by American Health Systems examined differences in charges between insured and uninsured patients. The list price was identical for all patterns. Price discrimination today occurs at the transaction price.

Comment: There is a hypothesis about delivery fees being more tightly concentrated because of the communication among consumers and the repeated use of the same doctors. You looked at 1971 data. It would be interesting to see a later year, because 1971 was a turning point in the fall of the birthrate, and in 1972 first births were the largest percentage of all births. If you still found the same distribution in 1972, then people must be communicating some way among themselves other than going to the same doctor repeatedly.

Question: Is there a spread in fees because of more complex situations by certain doctors and not by others?

William Hsaio: The points brought up may have an impact on the inter-State comparisons, but that is not true within a State. The carriers who provided data have a uniform policy in their payment.

Question: How standard is the product that you are pricing? Even though the general office visit is a standardized product, it seems that one of the dimensions to look at is variability in the quantity of office visits for a similar condition. Will you be able to get that sort of time series information?

William Hsaio: We do not have any plans to get time series information on that. The definition of medical and surgical procedures suffers from imprecision, particularly for office visits which vary from five minutes to fifteen minutes. There is a slightly more precise definition for surgical procedures.

Interim Research Findings on Physician Reimbursement Under Medicare

by Charlotte F. Muller and Jonah Otelsberg

Introduction

The 47 private insurance companies (carriers) that administer Medicare, have broad discretionary powers. These powers affect a number of reimbursement policies such as specialty groupings, geographic areas, procedural coding, claims investigations, and merging of Medicare and non-Medicare data. The purpose of the City University of New York (CUNY) research project was to examine the effects of the discretionary, administrative practices of Medicare carriers on fee levels, program expenditures, and carrier performance measures.

Methods of Study

The following analyses have been completed:

1. Carrier Fees — 50th percentile and prevailing for FY 1976 and FY 1977;
2. Carrier discretionary practices as reflected in replies to HCFA Intermediate letter 75–53;
3. Carrier performance as measured by workload and processing time measures;
4. Relationship of fees to socioeconomic variables; and
5. Relationship of assignment rates to socioeconomic variables and measures of carrier performance.

At this time, we have not completed the analysis of the relationship of fees to socioeconomic variables, discretionary practices, and performance measures.

The final report from the pilot study will include the analysis of carrier claims files, with special attention given to provider and beneficiary profile, and the findings from simulation studies of the effect of carrier discretionary practices on the determination of reasonable charge fees.

Fee Distributions

To study carrier-wide levels of fees under Medicare, we selected the 50th percentile fee, the midpoint of the distribution of weighted customary fees, as a measure of fee levels. The customary fee for each physician is the median of submitted charges. The 50th percentile fee in each Medicare locality is generated separately for general practitioners and specialists, unless the carrier combines all physicians performing a procedure into one group. For a given procedure, we excluded localities with zero use from the analysis. By averaging localities, we calculated carrier means by procedure and expressed them as a ratio to the national mean fee. We created a generalized measure of relative prices by averaging the ratios for some leading procedures.

Analysis of fee distributions showed a variable relationship between general practitioner and specialist fees (Table 1). For an initial comprehensive office visit, the 50th percentile fee varied from $5 to $64 for general practitioners and from $15 to $75 for specialists, with means of $29 and $41 respectively. The mean specialist fee for reduction of a fracture of the neck of the femur, a common procedure within an aged population, was only slightly higher than the general practitioner mean — $734 and $725, respectively. The mean general practitioner fee for a radical mastectomy was slightly higher than the specialist fee. The coefficient of variation showed that, for some carriers, certain procedures are close to the national price level while others are much higher than the national level, whereas for other carriers there is more homogeneity of Medicare fees.

Carrier Performance Measures

One aspect of carrier performance is attentiveness to Medicare control regulations. This results in claims investigation, denial, and reduction, thus keeping program expenditures down. Another aspect is speed in processing claims, which is favorable to physician acceptance of Medicare as a prime source of direct revenue, i.e., willingness to accept assignment. Claims reduction and denial, however, are negative events from the viewpoint of practicing physicians. All aspects of carrier performance ultimately affect patient costs and utilization under Medicare, largely through the choices exercised by physicians. They attempt to circumvent allowed-charge controls by refusing to accept assignment. This suggests that different carrier performance goals may be in conflict, and that priorities need to be adjusted to conditions in an area.

Still another aspect of carrier performance is the selection of available options within the process of reasonable charge determination, such as merger of "private business" claims with Medicare, procedures

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Table 1
1977 50th Percentile Medicare Fees By Type of Doctor and Procedure — U.S.A., Outliers Deleted

	General Practitioners					Specialists				
Procedure and 1964 CRVS Code	Number of Localities	Maximum	Minimum	Mean	Standard Deviation	Number of Localities	Maximum	Minimum	Mean	Standard Deviation
1. Initial limited office visit (9000) new patient	246	$25.00	$7.00	$13.03	$3.20	244	$37.20	$3.00	$17.29	$5.64
2. Initial comprehensive office visit (9002) new patient	264	63.80	5.00	28.77	12.69	263	75.00	15.00	40.74	12.19
3. Minimal office visit —established patient (9003)	195	12.00	1.00	5.36	2.29	201	13.00	1.00	5.76	2.49
4. Routine followup brief office visit (9004) established patient	255	13.00	6.00	8.63	1.49	254	15.00	6.40	10.48	2.00
5. Routine followup brief home visit (9014)	260	22.50	7.00	13.50	3.49	261	25.00	5.20	16.05	4.17
6. Initial brief hospital visit (9020)	240	42.00	6.00	25.03	7.04	239	50.00	10.00	30.08	8.24
7. Initial comprehensive hospital visit (9022)	248	63.80	6.00	36.55	11.47	247	80.00	20.00	46.15	11.73
8. Routine followup brief hospital visit (9024)	259	15.00	5.00	9.70	2.32	258	20.00	5.00	11.55	3.04
9. Biopsy skin (0171)	249	35.00	9.60	20.20	5.42	259	50.00	10.00	26.44	8.75
10. Radical mastectomy (0470)	217	880.00	400.00	622.96	141.79	260	1000.00	400.00	616.60	143.27
11. Reduction of fracture—neck of femur (0868)	192	1100.00	200.00	724.66	209.92	212	1450.00	429.00	734.28	181.86
12. Arthrocentesis puncture for aspiration of joint effusion (1046)	244	25.00	4.00	13.98	3.79	234	30.00	5.00	15.97	4.45
13. Needle puncture of bursa (1413)	236	25.00	4.40	14.41	3.95	241	30.00	5.00	15.64	4.30
14. Bronchoscopy (2111)	203	225.00	95.00	146.69	22.19	260	200.00	75.00	140.18	27.71
15. Thoracentesis (2183)	248	50.00	10.00	26.61	6.32	259	70.00	7.80	34.93	10.38
16. Catheserization of heart (2330)	199	550.00	18.70	264.03	121.47	215	525.00	18.70	247.35	98.45
17. Insertion of pacemaker (2356)	178	900.00	10.00	628.80	215.79	213	960.00	70.00	682.68	232.99
18. Blood transfusion (2445)	180	25.00	3.50	14.11	3.79	189	35.00	3.50	14.08	4.33
19. Colectomy (3179)	206	1000.00	450.00	676.77	129.59	247	1080.00	365.00	675.45	137.94
20. Appendectomy (3261)	214	500.00	87.50	298.47	72.34	244	552.50	200.00	329.35	75.14
21. Sigmoidoscopy (3310)	257	39.00	10.00	24.02	5.14	263	41.00	15.00	26.49	4.86

(continued)

Table 1 (Cont'd)
1977 50th Percentile Medicare Fees By Type of Doctor and Procedure — U.S.A., Outliers Deleted

	General Practitioners					Specialists				
Procedure and 1964 CRVS Code	Number of Localities	Maximum	Minimum	Mean	Standard Deviation	Number of Localities	Maximum	Minimum	Mean	Standard Deviation
22. Hemorrhoidectomy (3380)	216	400.00	150.00	269.44	58.86	240	450.00	150.00	274.99	57.19
23. Cholecystectomy (3515)	231	725.00	300.00	471.20	99.69	267	800.00	300.00	500.98	108.20
24. Repair hernia (3631)	248	450.00	158.00	281.64	63.23	264	500.00	190.00	308.11	65.34
25. Cystoscopy (3930)	211	80.00	20.00	43.54	12.02	3	100.00	85.00	43.33	7.64
26. Dilation of urethra (4031)	227	27.00	1.00	14.17	4.34	231	33.00	2.00	14.37	5.09
27. Prostatectomy (4316)	207	700.00	341.00	573.31	100.46	234	1110.00	350.00	654.72	146.70
28. Transurethral electrosection of prostrate (4321)	211	1020.80	250.00	648.10	133.61	203	800.00	350.00	593.01	90.41
29. Hysterectomy (4632)	224	828.00	350.00	562.00	129.64	245	950.00	300.00	595.73	125.69
30. Extraction of lens (5611)	204	900.00	350.00	594.55	109.28	243	1000.00	350.00	598.48	135.26
31. Chest X-ray (7100)	255	25.00	5.75	15.36	3.01	241	26.25	4.50	14.70	4.83
32. X-ray spine (7210)	248	40.00	8.75	24.66	5.22	237	52.00	6.00	25.00	7.92
33. X-ray hip (7300)	244	36.00	7.50	21.55	5.18	239	36.00	5.00	20.60	6.74
34. X-ray stomach (7356)	227	71.50	17.50	43.55	9.27	236	84.20	8.50	42.68	14.31
35. X-ray colon (7360)	242	65.00	15.00	40.99	8.88	238	75.00	6.00	40.36	12.20
36. Cobalt therapy (7603)	143	30.00	9.00	19.01	5.91	207	37.50	5.00	18.20	6.39
37. Radiotherapy—supervoltages (7609)	129	35.00	10.00	22.33	8.01	188	40.00	5.00	22.61	8.32
38. Hemoglobin (8622)	262	6.50	1.00	3.26	1.32	255	4.70	1.00	2.75	0.63
39. Blood, white cell count (8642)	257	5.00	1.00	3.14	0.78	255	5.00	1.00	2.91	0.78
40. Complete blood count (8628)	259	12.00	3.00	7.22	1.52	257	11.00	5.00	7.34	1.23
41. Cholesterol blood test (8712)	259	10.00	4.00	6.19	1.19	257	10.00	3.00	6.17	1.10
42. Hematocrit (8681)	259	6.00	1.00	2.96	0.77	259	5.00	1.00	2.83	0.70
43. Prothrombin time test (8712)	150	5.50	3.00	4.74	0.55	255	8.00	2.00	5.21	1.12
44. Sedimentation rate (8718)	260	7.50	2.00	4.36	1.07	258	7.00	2.00	4.10	0.98
45. Blood sugar (8722)	254	9.00	3.25	5.82	1.09	255	8.50	3.00	5.75	0.99
46. BUN—Urea nitrogen (8745)	258	10.00	3.00	6.09	1.23	254	9.00	3.00	5.95	1.04
47. Pap test (8911)	254	15.00	2.00	8.20	2.39	252	12.00	2.50	7.50	1.76
48. Urinalysis (8986)	259	6.00	2.00	3.50	0.91	261	6.00	2.00	3.83	0.82
49. EKG (Electrocardiogram) (9101)	260	25.50	10.00	18.77	3.35	262	28.00	10.00	19.12	3.38
50. EEG (Electroencephalogram) (9330)	216	76.60	10.00	47.99	13.01	224	76.60	13.00	48.30	12.61

Source: Reasonable charge tape, 1977, SSA followed when a physician has an insufficient data base for profile development, and specialty qualifications. These discretionary practices are difficult to identify and classify precisely but were included in the CUNY study.

Fee Regressions

In order to isolate the effect of carrier practices and performance on fees, control for local conditions affecting the physician service market is necessary. Hence, we ran preliminary regressions to evaluate the effect of socioeconomic and health resource factors on fees. Results were similar for unweighted fee indices and for fee indices weighted by actual local frequencies. The results summarized here are for unweighted fee indices and for SMI expenditures per beneficiary, another indicator of Medicare prices (Table 2). "Outlier" fee values were eliminated in all regression equations. Selection of variables for trial was based on study of a zero-order correlation matrix on factor analysis. A few variables selected from the Department of Health, Education, and Welfare's Area Resource File (ARF) explained between 51 and 72 percent of the variance of the different fee measures used. The ARF variables were all expressed as ratios to the national mean, but in several cases composite variables were created to correct for scale, e.g., population per active MD.

Family income was a significant positive factor in four of the seven estimated equations and ambulatory visits per bed in six;[1] osteopathic supply has a significant negative influence in three equations. The percentage of urban population had a significant positive effect in six equations, possibly capturing a concentration of the aged in an area, as well as other urban-related market forces. The significant positive effect of population per active physician is of interest because it conforms with conventional demand/supply analysis.

Table 2
Results of Regression of Fees on Selected Area Resource File Variables

		Independent Variables							
Dependent Variables	R^2	Intercept	FAMINC69	PCTAGED	POPACT	AMBVSBED	PCTURBAN	TOTMDENR	TOTDO74
GP77I50	.61 (.0001)	+.493	+.249 (.031)	−.259 (.0004)	+.171 (.021)		+.297 (.003)		
SP77I50	.54 (.0001)	+.092			+.232 (.0017)	+.150 (.0002)	+.493 (.0001)		
C77I50	.56 (.0001)	+.067			+.247 (.0005)	+.165 (.0001)	+.483 (.0001)		
GP76I50	.49 (.0001)	+.815	+.390 (.0001)	−.233 (.002)					
SP76I50	.62 (.0001)	+.003			+.287 (.0002)	+.160 (.0001)	+.525 (.0001)	+.038 (.0106)	−.025 (.0027)
C76I50	.65 (.0001)	−.105	+.246 (.034)		+.309 (.0001)	+.124 (.003)	+.397 (.0001)	+.038 (.008)	−.023 (.0041)
SMI75ENR	.65 (.0001)	+.045				+.222 (.0007)	+.733 (.0001)		

Note: Figures in parentheses indicate the level of significance.
GP77I50, SP77I50, C77I50 — Fee indices of 1977 50th percentiles
GP76I50, SP76I50, C76I50 — Fee indices of 1976 50th percentiles
SMI75ENR — 1975 SMI expenditure per enrollee
FHMINC69 — Median family income 1969
PCTAGED — Percent aged in total population
POPACT — Population per active physician
AMBVSBED — Ambulatory visits per bed [ratio of OPD visits to number of beds]
PCTURBAN — Percent of 1970 population residing in urban areas
TOTMDENR — Total enrollment in medical schools
TOTD074 — Doctors of osteopathy patient care with other
IRNGH75 — Full time interns and residents, non-general hospitals
PCTBED — Extended care beds as a percent of total hospital beds
Variables shown are those that entered the regression equations. Those considered are:

Demand — FAMINC69, SCHOOL70, MORT6574, PCTAGED
Supply — POPACT, EXPBED, AMBVSBED
Urban — PCTURBAN, DENSITY
Independent factors — TOTMDENR, TOTDO74, IRNGH75, PCTBED

All variables are expressed as ratios to national mean.

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[1] See definition in Table 2.

We will use factor analysis to select from available carrier variables of discretionary practices. Our final fee regressions will test the effects of claims processing time, denial rate, and other performance measures. We will delete outlying values for socioeconomic and carrier performance variables.

Findings on Performance of Carriers

Other interim findings concerned carrier differences in performance. An average of 48.0 percent of claims nationwide were assigned (Table 3). The proportion ranged from about 20 percent for Equitable-Wyoming to 77.2 percent for Rhode Island Physicians Service. (Oklahoma Department of Public Welfare has 97.2 percent of claims assigned.) There was substantial variation in assignment rates by type of carrier and region. The Workload Report (Table 4) also showed a claims denial rate averaging 5.5 percent for assigned claims and 7.0 percent for unassigned claims in FY 1976. Carriers in the Chicago region had the highest denial rates for all claims and for assigned claims, but carriers in the Dallas region had high rates of denial for unassigned claims (8.4 percent). The national rate of investigation for all claims submitted on Form 1490 and 1491, used for individual practices, was 10.5 percent, with the rate for unassigned claims being almost double that for assigned claims. Processing time averaged 13.6 days for assigned claims and 16.7 days for unassigned. The speediest carrier was Travelers-Virginia which processed claims in 6.7 days average time; the slowest was GHI-New York which took 36.6 days. Our future interpretation of investigation and denial rates will take into account varying size and complexity of claims.

Assignment Rate

Table 5 presents preliminary regression results on determination of assignment rate. The purpose of the regressions trials was to examine the effect of carrier processing performance on assignment when socioeconomic factors are considered. The results indicated that carrier performance characteristics such as claims investigation and denial rates influenced assignment rates. However, there is no clear effect for measures of efficiency based on processing time and changes in stock of pending claims. One possible explanation for this insignificance is that the regressions are based on one year of data. Thus, they do not permit a study of a lag relationship between perceived efficiency and physician response.

Table 3
Assignment Rate As a Percent of Claims Processed by Carrier Type and Medicare Region, FY 1976

Carrier Type	**Assignment Rate**
Total U.S.A.	**48.0%**
Blue Shield	51.0
Private for one area	50.0
Prudential	53.6
Metropolitan	57.4
Travelers	54.2
Nationwide	44.8
Equitable	36.2
Aetna	30.7
Group Health Insurance	43.4
Region	**Assignment Rate**
Total U.S.A.	**48.0%**
Boston	64.7
New York	50.9
Philadelphia	56.9
Atlanta	56.1
Chicago	42.3
Dallas	55.5
Kansas City	41.8
Denver	34.5
San Francisco	39.2
Seattle	32.3

Source: Part B Workload File I

Table 4
Claims Denied and Claims Investigated, as a Percent of Claims Processed by Carrier Type, FY 1976

	Claims Denied as Percent of Claims Processed			Claims Investigated as Percent of Claims Processed		
	Total	Assigned	Unassigned	Total	Assigned	Unassigned
Total USA	**6.0%**	**5.5%**	**7.0%**	**10.5%**	**7.3%**	**14.2%**
Blue Shield	5.7	5.2	6.6	10.4	7.4	14.3
Private for one area	6.6	6.1	8.2	10.9	5.9	16.2
Prudential	5.4	4.5	6.5	9.7	5.2	15.1
Metropolitan	6.5	4.4	9.5	9.0	7.3	11.3
Travelers	5.1	4.1	6.7	13.8	9.2	21.0
Nationwide	7.5	7.0	8.4	14.7	10.0	19.0
Equitable	6.4	5.6	7.1	10.9	8.0	12.6
Aetna	6.8	7.0	6.8	9.9	7.4	10.9
Group Health Inc.	5.3	5.8	5.2	6.1	6.1	6.0

Table 5
Preliminary Regression Results on Determination of Net Assignment Rate, 1976[1]

	Program-Related Variables[2] Equation 1 Regression Coefficient	Socioeconomic Variables[2] Equation 2 Regression Coefficient	All Independent Variables[2] Equation 3 Regression Coefficient
R^2	.35	.44	.82
$\bar{R}^2$	.25	.33	.72
Constant	1.853	1.413	2.940
PCDENET(A)	−.283[3]	—	−.165[3]
	(.092)		(.065)
PCINV(A)	−.288[3]	—	−.231[3]
	(.112)		(.090)
SMI-TR/MD	−.221	—	.058
	(.165)		(.219)
B-SHARE	−.152	—	−.546[3]
	(.185)		(.158)
REDBIL(A)	.113	—	.445[3]
	(.305)		(.218)
AVBIL(A)	−.167	—	−.234[4]
	(.159)		(.126)
DNMED	.088	—	.155[3]
	(.070)		(.049)
TPM(A)	.047	—	.112
	(.093)		(.068)
STOKPND(A)	.002	—	.005
AMBVSBED	(.005)	.497[3]	−.004
		(.191)	(.158)
POP/DO74	—	.044[3]	.055[3]
		(.021)	(.015)
MORT65-74	—	.058	.022
		(.038)	(.030)
SCHOOL70	—	−1.482	−2.294[3]
		(1.001)	(.781)
INCPC72	—	−.254	1.032[3]
		(.481)	(.413)
POP/MDOFC	—	.252	.070
		(.351)	(2.51)
PCTAGED	—	.152	−.397[4]
		(.252)	(.237)
PCTURBAN	—	.349	.046
		(.290)	(.223)
POP/MDENR	—	−.031	−.062[3]
		(.030)	(.021)

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[1] Figures in parentheses indicate the standard error.

[2] All variables are expressed as ratios to national mean.

[3] Significant at 95% confidence level.

[4] Significant at 90% confidence level.

APPENDIX

Data Sources

I. Medicare Data

1) Fee Year 1976 and 1977 fiftieth percentile and adjusted prevailing as reported by carriers for fifty most frequent procedures by locality.
   Also included are frequencies of use of procedures in the calendar year used as a basis for obtaining prevailing screens: CY 1974 for FY 1976 and CY 1975 for FY 1977.
2) Workload and processing time file for fee year 1976 (July 1975 — June 1976) Tape contains data collected from carriers on form SSA1565, by carrier.
3) Regional office replies to IM75–53, by carrier.
4) Medicare enrollment and reimbursement under Part B, by county, 1972 and 1975.

II. Carrier Data

The carriers being studied are Group Health Inc., New York and Blue Cross/Blue Shield, GNY. From each of them we have obtained:

1) Claims history file for CY 1974 and CY 1976
2) Provider file
3) Customary and prevailing fee schedules

In addition, the GHI reasonable charge determination program is being used in the pilot study.

III. Medicaid Data

1) 60 tapes containing data on services provided between January 1973 and June 30, 1975.
2) Provider file printout.

IV. Socioeconomic Data

Data from Area Resource File (ARF6) May 1977 were used as the basis for socioeconomic variables. The Area Resource File contains county data taken from various sources pertaining not only to socioeconomic variables but also to supply and utilization of medical services.

Table 5 Legend

PCDENET	Percent of claims denied
PCINV(A)	Percent of assigned claims investigated
SMI-TR/MD	SMI revenue per physician in non-hospital practice
B-SHARE	Beneficiary expense (estimate) as ratio to total SMI revenue to MDs
REDBIL(A)	Proportion of claims reduced
AVBIL(A)	Average submitted charge per assigned claim
DNMED	Percent of denials that were for services not medically necessary
TPM(A)	Mean processing time for assigned claims
STOKPND(A)	Percent change in stock of pending claims July 1975–June 1976
AMBVSBED	Ambulatory (OPD) visits per bed
POP/DO74	Population per doctor of osteopathy
MORT65-74	Mortality ages 65–74
SCHOOL70	Median school years completed
INCPC76	Per capita income 1976
POP/MDOFC	Population per MD in non-hospital-based practice
PCTAGED	Percent aged in total population
PCTURBAN	Percent of population residing in urban areas
POP/MDENR	Population per enrollee in medical school

Questions and Answers

Question: This question involves Table 1 in the paper. Comparisons of general practitioner fees and specialist fees for the same procedures generally show that specialists have higher fees except in the categories of radical mastectomies, reductions of fractures of the neck of the femur, and bronchoscopies. Therefore, is there not a classification problem in trying to compare general practitioner fees and specialist fees, with regard to those three procedures?

Jonah Otelsberg: The analyzed data were tapes from the Bureau of Health Insurance (BHI), which showed the 50th percentile and the prevailing charges. This means that these fees existed on the carrier level from localities; it does not necessarily mean that the fees have been used or the procedures performed. Both customary and prevailing charges can be determined using conversion factors (i.e., relative value units) and are not necessarily built on the history of the performance of procedures. Also, some of the 50 procedures (not all of which are shown in Table 1) show that certain laboratory fees charged by general practitioners are higher than specialists' fees, which may mean that general practitioners rely on these "bread and butter" items to offset what may be lower office visit fees, for example.

Comment: This may relate also to carrier discretion in terms of administrative practices, i.e., how specialists are defined for reimbursement purposes. In some carrier areas board-eligible specialists are classified as general practitioners for reimbursement purposes. In other carrier areas, any physician who has completed minimal training and designates himself a surgeon is considered a specialist. So the discretionary practices of the carrier must be correctly understood before comparing general practitioner and specialist fees.

Charlotte Muller: We had hoped in the original design of this project to study discretionary practices of carriers as to identify specialists for the pricing process. Although such a study was not possible from the data available for our questionnaire on discretionary practices, it should be possible in the future, since BHI will be collecting that information. We participated in framing the questions that might be used to collect some of these data. It is extremely important to know what the standard for classification as a specialist or general practitioner is—especially for self-designated specialists.

Question: With regard to Table 2, is the POPACT (population per active physician) variable the inverse of the usual physician per population variable? There are significant positive coefficients indicated in that regression, which are not in harmony with many other recent findings.

Jonah Otelsberg: Yes, we used population to physicians rather than the usual measure of physicians to population, in order to preserve significant digits in our data, since the number of physicians is rather small relative to population. If we had used physicians per thousand, we would have had few significant digits, whereas using population per physicians increased the number of significant digits. Also, a comment should be made as to the variables used in the regressions. We did not use the actual observations for a carrier, but all the variables were expressed in indices of the carrier observations to the national mean.

Question: Conventional supply and demand analysis conflicts with many other findings in the health care field. Did you expect this, and do you have an explanation for your opposite findings?

Charlotte Muller: We are aware of the controversy in the literature but were not prepared to discard orthodox economics (i.e., supply and demand analysis). It may be that some of the contrary findings could be explained by cost differences in the production of physician services in the areas of high supply. So there is not as much conflict with conventional theory as one might have supposed. We are continuing to check our findings. Supply and demand analysis did agree with our finding that in areas having relatively more doctors of osteopathy, the fees were lower. This is in line with competitive market reasoning, but we are checking it because of what seems to be a strong regional characteristic involved.

Physician Administrative Costs and Medicaid Participation

by Jerry Cromwell, Frank Sloan, and Janet Mitchell

Introduction

The private practice physician has always been, and continues to be, the key element in the delivery of medical care in the United States. Yet little attention has been given to the role financial incentives play in physicians' decisions to treat certain patients, delegate responsibility, bill patients, and administer their practices efficiently. This lack of attention has prompted investigation in two areas: (1) private practice physician participation in public benefit programs like Medicaid and (2) organization and administration of the practice itself.

Physician participation rates in state Medicaid programs, along with falling assignment rates under Medicare, accentuate the importance of understanding why physicians do and do not participate. This is especially true as we stand on the threshold of National Health Insurance. The options a physician faces in participating under NHI may be more important in terms of medical care access and costs than deductibles and coinsurance rates, which have preoccupied researchers and policy makers until now.

Equally important in terms of total program cost is the way in which physicians organize and administer their practices. More efficient practice modes should benefit physicians and consumers alike. Reimbursement policies can be instrumental in encouraging and discouraging efficient medical practice — as we know all too well from recent experience with cost-based modes of hospital reimbursement. The problems of cost and efficiency are exacerbated by limited price competition in the market for physicians' services, burgeoning supply, and the possible ability of physicians to affect the demand for their services.

A fundamental, implicit hypothesis throughout our work has been that physician participation and cost behavior may be partially explained in terms of variables amenable to public policy. In order to test this hypothesis, economic theory has been applied to new data on physicians and their practices. The results, we feel, support the importance of the public reimbursement lever, although more research needs to be conducted.

Data Source

The lack of reliable data on several key aspects of fee-for-service practice, including the effects of third-party reimbursement on physician administrative costs, necessitated a new primary data collection effort. A nationwide survey of 2,000 private practice, fee-for-service physicians was undertaken. In particular, the survey attempted to collect more accurate and more detailed cost data than had been obtained from mailed questionnaires. Other areas of interest included volume of services, physician income, fees, and malpractice insurance. The survey also explored issues not addressed by previous studies, such as group sharing arrangements, Medicaid participation, and administrative practices. The sample consisted of fee-for-service, private practice physicians in the five major specialties: (1) general/family practice, (2) general surgery, (3) pediatrics, (4) obstetrics-gynecology, and (5) internal medicine. Salaried physicians, as well as those practicing in prepaid group practices or in practices with more than 14 physicians, were excluded from the sampling frame to simplify the data collection and subsequent analysis.

The physician survey included two independent samples: a national sample and a sample of two regions (Mid-Atlantic and East South Central). The national sample was representative of all fee-for-service, private practice physicians nationwide and hence was used to generate national estimates of practice costs and Medicaid participation reported below. A total sample of 2,148 physicians was originally drawn for the national survey. After adjusting for a 30 percent ineligible rate, a net sample of 1,545 was obtained, from which 1,014 national interviews were completed. Interviewers succeeded in converting (i.e., persuading to participate) 25 percent of all initial refusals, increasing the overall response rate from 58 to 66 percent. While the telephone and letter follow-up necessary to convert these physicians was very time-consuming and costly, it clearly helped improve the survey results and reduce potential nonresponse bias.

Structure of Office-Based Practices

Size and specialty are the two basic structural components of a physician's practice. Almost two-thirds of the physicians (62.3 percent) are solo, with the relative proportions declining as practice size increases. One-third of the physicians (33.1 percent) practice in groups of two to five, while only 4.5 percent are found in groups of 6 to 14 persons.

Solo practice clearly remains the predominant practice mode in American medicine today. In part, this reflects the specialty distribution of our survey sample; general practitioners accounted for 39.9 percent of all solo physicians. Given the growing trend toward specialization, however, one can anticipate a shift over time from solo to group practice. Group practice structure can be described more fully by examining the distribution of multispecialty versus single-specialty groups. While only 12 percent of two to five physician groups are multispecialty, 48 percent of larger practices include multiple specialties. The structure of physician practice clearly varies by size, specialty, and, in the case of group arrangements, by specialty mix. Specialty mix is expected to influence the

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group income-sharing arrangements and choice of practice mode. These revenue-expense sharing arrangements may range from very simple methods (e.g., solely sharing costs of shared office space) to highly complex reimbursement formulas.

Three primary forms of sharing arrangements can be identified: (1) expense sharing; (2) equal income-sharing; and (3) unequal income-sharing. Expense-sharing groups constituted 20.7 percent of all physician groups in the sample (Table 1). These physicians shared only the costs of practice, with each member retaining all revenue he or she personally generated. Unlike income sharers, expense sharers are not "taxed" on their own effort, nor do they receive an income transfer from other group members.

Equal income sharing was the most prevalent financial arrangement in our sample; 57.1 percent of all group physicians fell into this category. These physicians shared both practice costs and revenues equally; each physician received a proportion of net practice income equal to 1/n, the number of physicians in the practice. Finally, in unequal income sharing groups (22.3 percent of groups) physicians received a share of net income, based upon some previously determined reimbursement formula.

Locus of Decision Making

Theory suggests that incentives inherent in these sharing arrangements may have perverse effects on physician performance. Given the potential disincentives in these arrangements, one wonders whether physicians seek to control each other in order to maximize net income. The practice of self-regulation, or the policing of individual group members, can be accomplished in a number of different ways. Decisions can be made democratically by the group as a whole, or policy making power may be vested in a few group members.

In order to identify the center of decision-making within groups, eight important cost and price decisions were included in our survey instrument. In each instance, the physician was asked whether he or she made the final decision on his or her own, whether it was a collective decision made with the other physicians in the practice, or whether the decision was delegated to a Board of Directors or a business manager. The decisions encompassed three primary areas:

(1) Cost control: the decision to hire an additional aide; the acquisition of an item of equipment costing more than $100;
(2) Price discrimination: the setting of fees; whether a fee is reduced because a patient is a hardship case; actions to be taken in the case of bad debts; and
(3) Decisions vis-á-vis insurers: whether a patient's Medicare claim is to be assigned; whether to accept Medicaid patients; whether to participate in a Blue Shield service benefits program.

It is apparent from Table 2 that decision-making regarding the purchase of both labor and capital inputs is highly centralized. In only six to eight percent of groups did individual physicians have complete discretion in input purchases. While group practices on the average appeared to exercise considerable collective control on costs, their behavior appeared to be quite different with respect to price. For example, the setting of fees was seen to be a collective decision (Table 2), but the individual physician generally retained the right to reduce fees in a hardship case. Thus the final *transaction* price was primarily the individual physician's decision. While at first glance contradictory, this decentralization of price-setting simply permitted more efficient price discrimination as the individual physician is better able to distinguish among patients' ability to pay.

Fee reduction is only one example of price discrimination. Physician participation in Medicaid, taking Medicare's "assignment" option, and physician participation in Blue Shield service benefits programs are other forms of price discrimination. According to Table 2, even though Medicare, Medicaid, and Blue Shield service benefits are all payment-in-full programs, decision making appeared to become more centralized as the effects were more widespread among group members. Physicians may, for example, share certain political attitudes about the Medicaid program and/or dislike the nature of the patient population that would enter their practice under the program. In addition, and probably more importantly, the collection costs incurred under Medicaid would affect all physicians in the group.

Choice of Practice Mode

The general model of physician utility maximization can be extended to incorporate choice of practice mode. The physician selects the practice setting yielding the highest utility. There is variation in choices because of differences in preferences for income (π), leisure (S) and practice amenities (A).

Besides financial rewards, different practice settings generate certain nonpecuniary amenities to physicians, such as autonomy, peer support, and assistance with management activities. Physician preferences may well be correlated with specialty and, hence, practice mode. Because of the recognized nature of the modes of treatment involved, certain specialists may enjoy consultation with other physicians and hence choose a group setting where they can obtain peer support. Holding specialty constant, physicians who value their independence highly are expected to enter solo practice; those physicians who dislike externally imposed controls, whether from their colleagues or from government, will also prefer to work alone. Finally, some physicians have a stronger dislike for managerial tasks and may be willing to give up a measure of autonomy by entering group practice where such activities can be shared with other physicians and/or delegated to employees. To test our theory of practice choice, we estimated an equation in which the physician's choice between solo (0) and group (1) practice (GRP) constitutes the dependent variable. We have focused on this dichotomous decision as the policy variables of interest (cost, efficiency, continuity of care, etc.) are believed to be a function of practice size. Explanatory variables encompass the arguments in the physician's utility function. Due to econometric problems inherent in the use of ordinary least squares regression with a binary dependent variable, probit analysis is used for the choice of practice mode regression. Results from

Table 1
Distribution of Specialties and Group Types by Group Revenue/Expense Sharing Arrangements (Percentage Distribution)

	Sharing Arrangements			
Specialty	Expense Sharers (20.7%)	Equal Income Sharers (57.1%)	Unequal Income Sharers (22.3%)	Total
General practitioners	26.2/21.5	50.8/15.1	23.1/17.6	100% /
General surgeons	21.5/17.7	63.1/18.8	15.4/11.8	100% /
Pediatricians	8.7/ 7.6	62.3/19.7	29.0/23.5	100% /
OB-GYNs	11.5/12.7	70.1/28.0	18.4/18.8	100% /
Internists	33.3/40.5	41.7/18.3	25.0/28.2	100% /
Total	/100%	/100%	/100%	
Group Type				
Single specialty	18.4/73.4	60.1/88.0	21.5/80.0	100% /
Multispecialty	32.8/26.6	40.6/12.0	26.6/20.0	100% /
Total	/100%	/100%	/100%	

Source: Abt-NORC Physician Survey, 1976.

Table 2
Decision Making in Partnerships and Groups (Percentage Distribution)

	Primary Decision Maker					
Decision	Individual Physician	Collective Decisions by Partners/ Shareholders	Business Manager	Different Departments, Medical Directors of Departments	Board of Directors or Subcommittee of Board	Total
1. The decision to hire an additional aide	6.7	80.6	8.8	0.7	3.2	100%
2. The acquisition of an item of capital equipment costing more than $100	8.0	83.7	3.1	0.7	4.5	100%
3. The setting of fees	9.2	85.0	1.4	1.0	3.4	100%
4. Whether a fee is reduced because a patient is a hardship case	87.3	11.0	1.7	—	—	100%
5. Actions to be taken in the case of bad debts	40.0	39.3	20.0	—	0.7	100%
6. Whether a patient's Medicare claim is to be assigned	45.5	42.9	10.3	—	1.3	100%
7. Whether to accept Medicaid patients	30.7	64.4	1.5	—	3.4	100%
8. Whether to participate in a Blue Shield service benefits program	15.4	80.3	1.1	—	3.2	100%

Source: Abt-NORC Physician Survey, 1976.

the probit analysis, along with means, also are presented in Table 3. While probit analysis does not provide a measure of the overall explanatory power of the equation, many of the coefficients were statistically significant in plausible directions.

INCOME and WORK, two variables directly measuring the marginal utility of income and leisure respectively, are insignificant. Physician differences in the value of net income may be almost entirely explained by the physician's choice of specialty. More objective measures of interphysician differences in time price are in the hypothesized direction, however. The coefficients of both CHILD (female physicians with children) and PY (outside income) indicate that physicians with a high time price prefer group practice. Nevertheless, it does not appear that practice mode is *dominated* either by the desire to earn an unusually high income or concern over work hours.

All specialists are significantly more likely to choose group practice over solo than are general practitioners, as anticipated. Income constraints clearly dominate the offsetting effects of specialty differences in time price and practice mode preferences.

The majority of the A variables are in the hypothesized direction, showing, for example, that management-averse physicians prefer group practice settings. While two variables measuring physician preference for autonomy have been included (INDEP and CON1), INDEP appears to be a much better measure of this taste factor and thus dominates CON1 (perceived bureaucratic constraints on medical practice) completely. These findings clearly indicate that practice mode choice and physician effort are, at least to some extent, jointly determined. The AGE coefficient is highly significant, suggesting younger physicians enter group practice to maximize earnings in the long run.

The regional coefficients indicate considerable residual variation in choice of practice mode by geographic area, although they are somewhat difficult to interpret. While WEST is in the constant term along with GP, we know that the GP coefficient must be negative because of the significant positive coefficients for all four specialty variables. It seems reasonable to assume, given a positive constant term, that WEST is positive and possibly significant as well. Group practice thus appears to be much more prevalent in the Western census region than in other parts of the country.

The coefficients on URB1 (practice in one of the 10 largest SMSAs) and URB2 (non-SMSA) indicate some production constraints on choice of practice mode; group practice appears to be relatively less feasible in very small communities. Finally, nonwhite physicians appear to practice alone. We cannot determine, however, to what extent RACE also acts as a proxy for foreign medical graduates and hence may reflect perceived differential abilities as well as pure discrimination on the part of groups dominated by white physicians.

Physician Participation in Medicaid Programs

Although Federal law establishing Medicaid is now more than ten years old, there are surprisingly little data on Medicaid at the national level. In particular, no national estimates of the proportion of physicians participating in Medicaid have been available. Our survey contributes to factual knowledge on Medicaid, specifically on aspects relating to fee-for-service physicians in private practice. While the sample was restricted to the five primary care specialties, these physicians represented the mainstream of ambulatory medical care in this country.

As shown in Figure 1, the participation rate was highly skewed towards the left-hand tail of the distribution, i.e., towards nonparticipation. The numbers at the top of each bar represent the absolute number of physicians in that percentage category. Since the histogram is based on almost 1,000 physicians (958), these numbers can be interpreted fairly accurately as percentages. Thus, 38.3 percent of all primary care, private practice physicians participated in Medicaid, but Medicaid patients accounted for 10 percent or less of their total practice volume. This number dropped sharply to approximately 12.5 percent for those physicians with 11 to 20 percent of all visits made by Medicaid patients, and tailed off thereafter.

Medicaid Participation: Theory and Evidence

According to a general model of price discrimination, physicians are assumed to order patients by their ability to pay, first treating those who can afford the most, then filling in the rest of their time with less wealthy patients. Public programs, like Medicare and Medicaid, tend to set reimbursement levels below physicians' normal fees, thus institutionalizing price discrimination. Medicare and, to a much greater extent, Medicaid act as residual categories, absorbing private physician resources at the margin.

The number of public benefit patients who will be treated in this manner should depend upon economic factors like the ability of private patients to pay (including insurance coverage), fee schedules of public programs, the administrative costs of obtaining reimbursement from public and private programs, the hours a physician is willing to work, and the price of non-physician inputs. Physician training and political attitudes also are expected to play a part.

Our results on the whole are consistent with the theory. Low Medicaid fee schedules were cited by physicians as a major reason for non-participation. More significantly, their revealed behavior confirmed these subjective responses (Table 4). Where fee schedules (MDP) were higher, physicians treated more Medicaid patients, accepting the schedule as payment-in-full, holding other factors constant. Similarly, where private insurers were relatively more generous (BSP), participation fell. Raising the fee schedules of public programs would undoubtedly increase access for some of the poor to office-based physicians, as well as spreading the current Medicaid population across a broader number of physicians.

The strength of this effect is diluted, however, by inter-program competition. The fee hierarchy established nationwide more or less insures that private payers will be the price leaders in a local area, placing public programs at a distinct disadvantage. To improve participation, it is not enough to raise the Medicaid or Medicare fee schedules if private payers raise their fees at the same time. Public schedules must increase faster than private rates if participation is to increase.

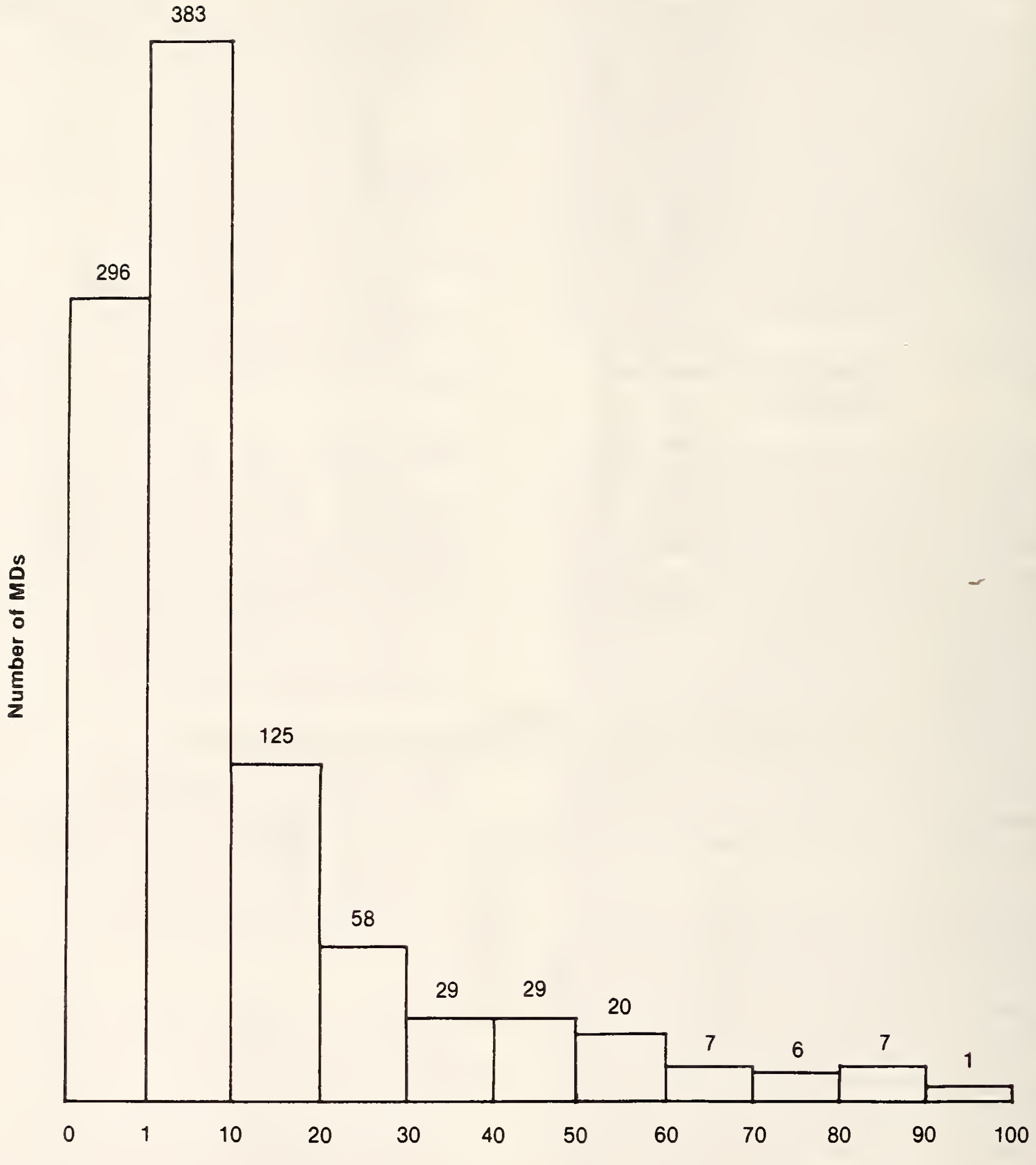
Table 3
Choice of Practice Mode Regression

Independent Variables	Probit Regression (t-ratio)	Means	
		Solo Physicians	Group Physicians
WORK	−0.060(−0.62)	0.49	0.49
INCOME	0.003(0.03)	0.50	0.49
PEER	0.173(1.65)	0.71	0.75
INDEP	−0.497(−4.06)	0.87	0.76
HELPS	0.177(1.62)	0.22	0.36
HELPA	0.397(3.89)	0.48	0.62
CON1	−0.072(−0.76)	0.61	0.52
GS	0.365(2.54)	0.17	0.17
PD	0.681(4.34)	0.10	0.18
OB	0.725(5.11)	0.13	0.23
IM	0.543(4.06)	0.19	0.25
GP	—	0.40	0.17
AGE	−0.051(−5.14)	55.22	48.49
AGE^2	−0.001(−1.36)	—	—
CHILD	0.368(1.97)	0.01	0.06
RACE	−0.143(−1.27)	0.23	0.23
PY	0.187(1.54)	0.18	0.20
URB1	0.086(0.82)	0.44	0.51
URB2	−0.307(−1.70)	0.11	0.06
NEAST	−0.154(−1.04)	0.37	0.32
SOUTH	0.011(0.07)	0.19	0.26
NCENTRL	−0.205(−1.37)	0.27	0.24
WEST	—	0.18	0.18
CONST	2.25(3.42)	—	—

Table 4
Effects of Selected Explanatory Variables on Medicaid Participation

Independent Variables	Elasticity		Marginal Effect	
	Tobit	OLS	Tobit	OLS
MDP	0.71	0.90	—	—
BSP	−0.39	−0.48	—	—
MD1	−0.09	−0.023	—	—
MD2	−0.27	−0.12	—	—
MD3	−0.06	−0.18	—	—
Y	−0.40	−0.23	—	—
MCAID	0.08	0.43	—	—
FMG	—	—	4.43	5.06
IM	—	—	−2.76	−3.16
WAGE	−1.88	−1.13	—	—
A60	—	—	−1.59	−4.59
EQ1	—	—	3.00	2.59
EQ2	—	—	−0.51	−0.20

Figure 1
Medicaid Participation Rate



Percent Medicaid Patients in Practice

Physician willingness to participate is also explained in part by the administrative burden involved in obtaining reimbursement directly from the government. The "red tape" resulting from payment delays and informational requirements definitely lowers participation in public programs. This is reflected by negative signs for MD1, MD2, and MD3, measuring claim return rates, delays, and complexity of form, respectively. Assuming cost control is desirable, the marginal program dollar may be better spent on improving payment mechanisms than on raising fees. This would certainly imply large investments in new technologies in many States, but these costs would be nonrecurring while fee increases would remain in perpetuity.

The price of nonphysician inputs, primarily labor (WAGE), was also found to influence participation. Physicians in high wage areas see fewer Medicaid patients, holding other factors constant, choosing to limit their practice to more affluent (or better insured) patients. This has implications for regulatory activity in other health industries. For example, physicians must compete primarily with hospitals for medical labor (technicians, nurses, young physician employees). The more generous hospitals are in paying their medical staff, the higher will be the operating costs of office-based ambulatory care. This, in turn, may discourage physicians from taking lower-paying Medicaid patients. Effective Federal regulation of hospital costs — including wages and salaries — could have a positive, unintended side-effect on access by the poor to physicians in their offices. Unfortunately, the continued failure of the government to regulate the hospital industry effectively makes it more difficult to recruit physicians for non-hospital programs for the poor—who ultimately bear the burden.

Although monetary variables clearly play a major role in decisions to participate, physician background and training also have policy significance. The Health Professions Education Assistance (HPEA) Act has concluded that no absolute physician shortage currently exists in the United States. One legislative response was to restrict the immigration of foreign-trained physicians (FMGs), causing potential problems for public benefits programs like Medicaid and community mental health centers. For example, our study showed that the FMG participation rate in Medicaid was higher than that of domestically-trained physicians. New U.S. graduates may fill the role of these FMGs, but it is unlikely that many will be willing to live among the urban or isolated rural poor and make ambulatory care available as FMGs have done. On the positive side, the HPEA Act calls for more family practitioners with a shift in emphasis away from the present specialty orientation of U.S. medicine. This approach to improving access to primary care would have the additional advantage of increasing physician participation in public programs.

Low fee schedules and administrative red tape synonymous with public programs do not necessarily imply that physicians refuse to treat the poor. They may well continue to do so for charitable reasons. More generous public fee schedules, on the other hand, may simply result in a substitution of public for private charity, as in the hospital sector. The question of whether this is the case with primary care physicians is crucial to the overall concern over participation rates. All the evidence suggests that little of this type of substitution is, in fact, occurring. It also suggests—and both Tobit results and cross-tabulations of losses by physician net incomes corroborate—that more public-spirited physicians are bearing a disproportionate burden of patients' inability to pay. EQ1 in Table 4 indicates physician agreement with the concept of health care as a right, EQ2, strong disagreement. The signs on participation are as predicted. This does not mean that income transfer programs are appropriate for participating physicians; they already exist through Medicare-Medicaid. We mention it only to reinforce the idea that greater access of the disadvantaged to physician care has been achieved at a much lower out-of-pocket cost to patients.

Finally, the evidence on physician bad debts suggests that direct billing of the government for public beneficiaries may be attractive — at least to some physicians. While the willingness to accept a discount for the privilege of direct billing was generally quite low (no doubt influenced by the administrative burden involved), hundreds of millions of dollars could be saved annually by slight reductions in allowable fees. Greater savings may be possible if reimbursement procedures could be streamlined.

Most encouraging is the fact that political attitudes about public welfare programs do not dominate physician decision-making. A general reluctance of physicians to participate based on ideology can be overcome through a variety of short- and longer-run policy decisions like (1) raising fee schedules; (2) reducing payment delays; (3) simplifying data requirements for reimbursement; (4) continuing the influx of FMGs and/or altering the specialty mix; and (5) controlling hospital costs.

Efficiency and Costs in Private Practice

Questions of efficiency have definite implications for the cost of ambulatory care and, interestingly enough, for physician participation in public programs. Lower operating costs increase the overall supply of medical services, encouraging physicians to see more public benefits patients at the margin.

The theory of physician behavior regarding practice choice, organization, and administration encompasses inefficiency of all kinds — scale, allocative, and slack. Many physicians prefer the independence of solo practice, while others prefer groups where administrative responsibilities and costs can be shared. The former practice tends to be inefficient because it fails to take full advantage of the scale economies accruing to the division of labor. Larger groups tend to be inefficient because, within broad limits, *carte blanche* is given individual members in defining work effort and utilizing shared inputs. Inefficiency in all settings is tolerated by consumer and provider alike due to the difficulty in defining and measuring practice output, subsidized utilization by third-party payers, and a general disinterest on the part of high income physicians in cost control.

Evidence supporting the theory is considerable (Table 5). First, physicians in solo practice spend more time (valued in dollar terms in Table 5) on routine administrative activities, resulting in significantly higher costs per visit. If administrative costs incurred in solo practice could be reduced to those experienced in small groups, nearly $300 million could be saved per year.

Second, physicians' practices have traditionally been grouped by size. For some purposes this taxonomy has analytic meaning, but a striking result of our empirical analysis is that some groups look on the surface more like solos. Groups sharing only expenses, for example, exhibit

Table 5
Administrative Costs Per Unit of Output by Practice Size and Type[1]

Administrative Activity	Cost per Visit[2] Solo	2–5 MDs	6–14 MDs	Expense Sharers	All MDs
Direct Costs					
Making appointments, receiving, and registering patients					
Non-MD	$0.49	$0.31	$0.32	$0.43	$0.43
Preparing health insurance forms					
MD	0.29	0.14	0.13	0.27	0.24
Non-MD	0.23	0.11	0.10	0.17	0.19
Total	0.52	0.25	0.23	0.44	0.43
Accounting, billing, cashiering					
MD	0.05	0.03	0.01	0.05	0.04
Non-MD	0.22	0.13	0.10	0.22	0.19
Accounting and billing purchased	0.19	0.20	0.15	0.16	0.19
Total	0.46	0.36	0.26	0.43	0.42
Medical records management					
Non-MD	0.16	0.09	0.11	0.16	0.14
Other administrative activities					
MD	0.63	0.61	0.76	0.73	0.64
Non-MD	0.06	0.06	0.06	0.05	0.06
Legal purchased	0.04	0.06	0.03	0.03	0.05
Total	0.73	0.73	0.85	0.81	0.75
Total administrative labor and purchased costs	2.36	1.74	1.77	2.27	2.17
Indirect costs					
Business office space cost	0.28	0.25	0.22	0.17	0.26
Business equipment cost	0.02	0.02	0.03	0.02	0.02
Total administrative costs	$2.66	$1.91	$2.02	$2.46	$2.45

[1] Functions do not all contain the same components. Purchased services are assumed to pertain only to "accounting, billing, and cashiering," and "other administrative activities" while the physician has been assumed to be uninvolved in "making appointments" and "medical records management."

[2] Except for "making appointments," where visits pertain only to those in the office, visits include all categories: office, house, clinic, and hospital.

Source: Abt-NORC Physician Survey, 1976.

total administrative costs per visit more similar to those experienced in solo practice than other groups and are often nothing more than solo practitioners practicing in the same building.

Centralized control over costs applies only to a limited set of inputs; division of labor in many tasks is constrained by individual, not group, demand. For this reason, we developed an analytic taxonomy based on both size and sharing arrangement. Administrative cost regressions showed the efficient scale to be approximately six physicians. This estimate, while seemingly low, is actually higher than some others have reported. We attribute this to the fact that for the first time sharing arrangements have been held constant. As predicted, practices composed of equal sharers (the most prominent sharing mode of group medicine in our sample) exhibited a rising average administrative cost curve throughout the relevant range, although costs remained below those of solo practitioners. This is interpreted as *prima facie* evidence that scale economies are partially offset by sharing arrangements which discourage cost control and increased effort at larger practice sizes.

Third, perverse incentives can be offset by collective decision making, either through meetings with partners or by delegation to an office manager. Group practices in which physicians were unconstrained in their purchase of inputs had administrative costs about 20 percent higher than the average for all groups. Practices without any form of collective decision making, however, were a small percent of all groups. Evidently most practices do try to police themselves to maximize joint income.

Fourth, physicians do not choose practice type randomly, but with an eye to the independence and administrative burden involved. Physicians choosing group practice definitely were less interested in autonomy, sought more peer consultation, and wanted help with onerous personnel and other administrative tasks. This gives us the first solid evidence that physician preferences concerning crucial issues of resource management differ significantly between solo and group practice.

And fifth, higher administrative costs were found in specialists' practices and in those operating in physician-rich areas. The fact that physician fees and the physician-population ratio are positively correlated, therefore, is explained in part by higher administrative costs. The addition of one physician per thousand population raised administrative costs a full 22 percent. Low price elasticities of demand would suggest that physicians are capable of shifting forward nearly all of the additional costs associated with underused capacity. *If* physicians were successful in passing on all of their additional administrative costs, total revenues (or expenditures) per physician would increase 4 percent for every unit increase in the physician-population ratio. Determining whether higher costs are justified requires an evaluation of patient outcomes with longer physician contacts. If the higher costs are not justified, then the additional overhead cost associated with physician maldistribution would represent an inefficient use of resources. It also calls into question the legitimacy of using cost-based fee schedules with inter-area adjustments for lower volume.

Questions and Answers

Question: Until recently in New York State, there were factoring companies specifically for collecting Medicaid fees, because Medicaid was so slow in paying their bills. (Carriers are not allowed now to reimburse the factors under Medicare or Medicaid.) What is the significance of factoring companies in terms of administrative costs of physicians' offices and Medicaid patients, and where do factoring companies fit into your model?

Jerry Cromwell: The factoring companies were not put into our model, because it is hard to generalize from the New York experience to the nation. In the U.S., how prevalent are the factoring companies? Do they account for a significant number of billings?

Question: In relation to public and private charities substituting, does it not seem surprising that you found that physicians with many bad debts also have many Medicaid eligible patients? This may relate to physicians' desires to help poor persons, including both Medicaid eligibles and those whose income levels do not qualify them for Medicaid.

Jerry Cromwell: That is quite possible. Obviously, we are indirectly analyzing the question of substitution of public for private charity by looking at reduced fees and bad debts. We only succeeded partially. In our analysis, we tried to hold constant the ability of the patient population to pay, which we hoped would adjust for some of the examples of a poor client population receiving free care. The findings so far evidence some substitution, although not an overwhelming amount.

Question: What percentage of bad debts can be attributed to physicians billing Medicaid agencies and not being reimbursed?

Jerry Cromwell: Our program excluded that kind of information from our definition of bad debts and reduced fees. Any kind of reduced fee or bad debt that the physician would consider as a result of participating in the program was also excluded. (For example, the difference between the normal rate a doctor charges for a service and what he or she charges Medicaid patients for the same service under the allowable fee is not considered as a reduced fee.)

Question: Why do you think estimates of reduced fee/bad debts are upwardly biased?

Jerry Cromwell: It is simply an opinion that physicians themselves have a tendency to overestimate the extent of their generosity. In the original questionnaire we made reference to the IRS Schedule C, which physicians use to report bad debts. Since this suggestion was not well accepted by the physicians, we left the question open-ended so that they could go back to the form if desired. Therefore, there were some very specific responses and some general estimates, but in both cases an upward bias can be expected.

Question: How was information obtained for the 30 percent of physicians who do not participate in Medicaid, with respect to delayed payment and the percentage of bills that come back?

Jerry Cromwell: We relied on those physicians who do participate in Medicaid—which could introduce bias in either direction.

Question: Is it possible that physicians who do not participate in Medicaid will exaggerate the administrative burden?

Frank Sloan: That concern has been raised previously and we are going to rerun the analysis dropping those physicians. The analysis did include a measure to address that problem, at least indirectly. We asked physicians if they felt that the government was obtrusive in regulating the physician community. As predicted, that variable was significant and positive — physicians who felt that the government was creating a lot of problems through regulation did report significantly more time spent on administrative duties. The variable was included in the equation and so to a partial extent was held constant.

Question: The fact that physicians responding affirmatively to the government intervention question also spend more time in administrative functions does not necessarily prove the direction of causality. The causality may be the reverse: high administrative costs may lead physicians to believe that the government is obtrusive. Also, the use of cross-sectional data to make time series interpretations, especially in the area of bad debts, is a very sensitive issue. Specifically, the next question concerns the implication made by an inter-temporal interpretation of the relative high loss ratio of participating physicians in the cross-sectional data. The implication is that current need is now being addressed that was not previously being addressed. How do you make a time series statement based on cross-sectional data?

Jerry Cromwell: Problems do exist in trying to make such statements, but in general, theory would still predict cross-sectionally, lower, bad debts and reduced fees for participating physicians. Our evidence does not suggest that that is the case, or at least not significantly so. Information can be interpreted inter-temporally, but cautiously. A cross-sectional time series would have been preferable, but our evidence still makes a positive statement about the program and about the fact that physicians will take care of the poor if you pay them, as indicated by the new need that is being met.

The Effect of Medicare/Medicaid Reimbursement on Physician Behavior: A Summary of Findings

by John Holahan, William Scanlon, Jack Hadley, and Robert Lee

Background

This paper will present some of the results from an Urban Institute study of physician pricing. The objectives of the study were to:

- Analyze differences between charges made on non-assigned and assigned claims to Medicare and between Medicare and Medicaid charges for similar procedures; differences between total and "optional" assignment rates; and changes in the ratios of billed to reasonable charges in Medicare and Medicaid.
- Analyze changes in indices of fees, service complexity, service volume and revenues in Medicare over the period 1972–1975, and determine if there were differences in prices and patterns of service delivery between the price control (1972–1974) and non-control (1975) years.
- Develop and estimate an econometric model which explains physicians' price and output decisions, with particular emphasis on the effects of private fees and Medicare and Medicaid reasonable charge screens on services provided on an assignment basis in Medicare and to Medicaid patients.

The data consisted of all claims made to Medicare and Medicaid programs during the last quarter of the fiscal year in each of four years (1972 to 1975) by a sample of 5,000 physicians in California. The physicians in the sample were drawn from eleven specialties and were distributed geographically across the state. There were 1,396 general practitioners, 786 general surgeons, and 942 internists. Most of the findings reported here are based on analyses of those physicians. Because we were interested in examining changes in services over time, it was important to eliminate physicians whose service patterns would be interrupted by changes in location or practice mode. Therefore, all sample physicians practiced in the same location during each of the four years. Furthermore, the sample was limited to solo-practitioners because it was not possible to identify billings of individuals within a group. The claims record allowed us to identify the date of service, procedure code, patient ID number, actual charge, and amount paid for each procedure. Two other files containing data on the physician's customary and prevailing charges were attached to the physician's record for each claim.

Findings

Analysis of Charge Differentials

Examination of 25 of the most frequently performed procedures for 1975 revealed that billed charges on non-assigned Medicare claims were, on the average, roughly 5 percent higher than on assigned Medicare claims and 7 percent higher than on Medicaid claims. Further analysis revealed that physicians bill virtually the same amount to each program; differences in average charges among programs were due to differences in the composition of physicians. The data indicated that assignment rates (percentage of claims assigned) in Medicare were 60 percent for general practitioners, 56 percent for general surgeons, and 40 percent for internists. This is somewhat comparable to the figures usually cited in other surveys. However, after eliminating joint Medicare-Medicaid claims, for which the physician must accept assignment, assignment rates fell to 33 percent for general practitioners, 37 percent for general surgeons, and 22 percent for internists. This suggests that physicians may be much less willing to accept assignment than is commonly assumed and that policies to increase voluntary assignment may face significant resistance.

We examined the ratio of actual to allowed charges and found remarkable growth in that ratio over the four years. (During this period, the Economic Stabilization Program imposed controls on the growth of Medicare reasonable charges. The California Medicaid program permitted Medicaid reasonable fees to increase by only 2.5 percent in 1973). In 1972, actual charges exceeded allowed amounts by approximately 11 percent on assigned claims and by 12 percent on non-assigned claims. By 1975, actual charges exceeded allowed amounts by roughly 26.5 percent for both assigned and non-assigned claims. In Medicaid, actual charges exceeded allowed amounts by about 15 to 28 percent in 1972, depending on specialty. By 1975, actual charges were 30 to 47 percent in excess of allowed amounts. We additionally examined dispersion in physicians' fees and found that inter-physician variation in actual charges is much greater than inter-program, inter-specialty or inter-area variation.

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Analysis of Fees, Service Complexity, Service Volume and Revenues in Medicare During the Economic Stabilization Program

The Economic Stabilization Program (ESP) imposed controls on physicians' fees from August 1971 through the end of April 1974. The ESP's objective was to constrain the growth in allowed charges in 1972, 1973 and 1974 to 2.5 percent per year. In 1975, controls were removed, and reimbursement rates were permitted to increase.

This study first examined the change in actual and reasonable charges during and after the control period. (Data were not available to examine changes in charges or services between 1971 and 1972.) Table I provides price indices developed for both actual and reasonable charges for the four year period, 1972 to 1975. The price indices using base year service weights show that actual charges rose slightly faster than controls allowed in 1973, significantly more rapidly in 1974, and jumped very sharply in 1975 for all three specialties. Reasonable charges, which are controlled directly by the Medicare carrier, were held well within stated limits for both assigned and non-assigned claims in 1973 and 1974. Reasonable charges increased significantly between 1974 and 1975.

The second half of Table I shows price indices based on current year service weights. In each year, both actual and reasonable charges increased faster than the corresponding base year service weights indices. The difference between the two sets of indices appears to be due primarily to increasing service complexity. Other results showed that fee inflation through use of the procedure coding terminology system occurred throughout the four year period. It did not appear to be related to the price control years.

Table 1
Changes in Medicare Actual and Reasonable Charges (Per Service)

All Services
1972 Service Weights

		Mean Charge	Indices		
		1972	1973	1974	1975
General practitioners	Actual	$8.80	1.029	1.094	1.229
	Reasonable	8.07	1.011	1.024	1.098
General surgeons	Actual	14.99	1.027	1.092	1.225
	Reasonable	13.70	1.011	1.032	1.089
Internists	Actual	12.62	1.043	1.114	1.239
	Reasonable	11.57	1.017	1.042	1.107

Current Year Service Weights

		1972	1973	1974	1975
General practitioners	Actual	8.80	1.057	1.130	1.320
	Reasonable	8.07	1.041	1.061	1.196
General surgeons	Actual	14.99	1.072	1.139	1.315
	Reasonable	13.70	1.058	1.080	1.182
Internists	Actual	12.88	1.040	1.119	1.264
	Reasonable	11.57	1.033	1.067	1.158

Source: John Holahan and William Scanlon, "Price Controls, Physician Fees and Physician Income From Medicare and Medicaid" (Washington: The Urban Institute, 1978)

Table 2
Numbers of Medicare Services and Gross Medicare Payments Made to Physicians, California
1972–1975

	1972	1973	1974	1975
			(Ratio to 1972)	
Numbers of Medicare Services (All Procedures)				
General practice	192,823	1.094	1.186	1.093
General surgery	40,257	1.109	1.214	1.230
Internal medicine	151,026	1.087	1.246	1.277
Gross Medicare Payments				
General practice	$1,742,408	1.119	1.258	1.303
General surgery	$1,414,635	1.101	1.273	1.389
Internal medicine	$1,773,577	1.129	1.347	1.513

Source: John Holahan and William Scanlon, "Price Controls, Physician Fees and Physician Income From Medicare and Medicaid" (Washington: The Urban Institute, 1978)

We next examined changes in the volume of services. The results (Table 2) demonstrate that physicians expanded the volume of services provided to Medicare during the control years. For each of the 3 specialties, the total volume of services rose by roughly 10 percent in the two price control years. Medicare enrollment increased by only 2.5 percent in each year. In 1975, after controls were removed, service volume rose only slightly for general surgeons (1.3 percent) and internists (2.5 percent) and fell markedly for general practitioners (−8.0 percent). The small changes in services in 1975 occurred despite a 2.6 percent increase in Medicare enrollment.

The net result is that gross Medicare payments to our sample physicians increased more during the two price control years than in the year after. Between 1972 and 1973, gross Medicare revenues of general practitioners, general surgeons, and internists increased by 11.9, 10.1 and 12.0 percent, respectively. In the second year of controls, gross revenues increased by 12.4, 15.6, and 19.3 percent, respectively. During the first year after controls, incomes grew by 3.6 percent for general practitioners, 9.1 percent for general surgeons and 12.3 percent for internists. The main impetus in the first two years was the increase in services and, in the last year, the sharp rise in charges.

We have no data on services provided by the sample physicians in the private market. Thus, we do not know if we have observed a substitution of Medicare for private patients or a general increase in services. Finally, many other changes affected the medical marketplace during these years, e.g., increases in the unemployment rate, the number of malpractice claims, and the supply of physicians. Thus, the fluctuations we have observed cannot be attributed solely to the price controls.

Econometric Analysis of Physician Pricing and Output Decision

Price Functions

Our model of physician pricing behavior combined theories of multi-market and inter-temporal pricing to derive a number of hypotheses. A quick sketch of some of these will be helpful in interpreting our results.

First, our pricing model suggested

(1) that raising reasonable fees would cause some physicians to raise their private charges;
(2) that physicians who voluntarily treat Medicaid patients would tend to have lower prices in the first place.

The first proposition was not amenable to direct testing, primarily because the method of computing reasonable fees would alone be sufficient to find a strong statistical relationship between reasonable fees and billed prices. Thus, the coefficients of the Medicare and Medicaid fees reported in Table 3 probably overstate the increase in private charges which would follow a rise in reasonable fees. The second proposition was tested by looking separately at Medicaid participants and non-participants in our price equations. As predicted, participants and non-participants have significantly different coefficients, thus supporting our multi-market model.

A second hypothesis deals with the impact of price controls. If the Economic Stabilization Program were effective, one would expect prices charged to be significantly lower in price control years. Following a standard approach, this was tested by including variables for each of the price control periods in our sample, 1972, 1973 and 1974. The results (Table 3) clearly support the hypothesis that the ESP constrained billed charges per California Relative Value System (CRVS) unit. Note that the ESP's effect was only about half as large in the 1974 period which was only partially covered by controls.

Table 3
Reduced Form Price Equations
(Dependent Variable = Billed Charge Per CRVS Unit)

	General Practice	General Surgery	Internal Medicine
RP	1.0140[1]	1.0180[1]	0.9678
(Medicare Reasonable-Participants)	[0.036]	[0.050]	[0.042]
RNP	0.8939[1]	0.8946[1]	1.1451[1]
(Medicare Reasonable-Nonparticipants)	[0.054]	[0.056]	[0.096]
MDCRE	−0.0749[2]	−0.0837[2]	0.0892
(Medicare Participants' Intercept)	[0.034]	[0.040]	[0.063]
FP	0.4462[1]	0.6482[1]	0.6683[1]
(Medicaid Reasonable-Participants)	[0.055]	[0.081]	[0.060]
FNP	0.2456[1]	0.4341[1]	0.2805[1]
(Medicaid Reasonable-Nonparticipants)	[0.054]	[0.066]	[0.064]
MCD	−0.1302[1]	−0.1106[2]	−0.2164[1]
(Medicaid Participants' Intercept)	[0.036]	[0.051]	[0.043]
DR	−0.4284E-3	−0.8316E-3[1]	−0.6540E-3[1]
(% Change in Medicare Reasonable)	[0.23E-3]	[0.23E-3]	[0.17E-3]
DWAGE	0.1564E-3	0.7329E-4	0.2394E-3
(% Change in Wage)	[0.12E-3]	[0.21E-3]	[0.20E-3]
	−0.0808[1]	−0.0869[1]	−0.0662[1]
1973	[0.006]	[0.010]	[0.009]
(year dummy)	−0.04114[1]	−0.0499[1]	−0.0347[1]
1974 (year dummy)	[0.005]	[0.009]	[0.009]
MPRM	0.3175E-3[2]	0.1748E-2[2]	0.1628E-2[2]
(Malpractice Premium)	[0.14E-3]	[0.91E-3]	[0.71E-3]
WAGE	−0.8665E-2[2]	−0.1129E-2	0.4754E-3
(Average Salary in Physicians' Offices)	[0.369E-2]	[0.668E-2]	[0.63E-2]
OWNMDS	−0.0935[1]	−0.0373[2]	−0.0068
(Own Specialty per Capita)	[0.023]	[0.018]	[0.012]
OTHMDS	−0.0139[1]	—	—
(Other Specialty per Capita)	[0.004]		
LITTLE	0.0103[2]	−0.0167[2]	−0.2951E-2[1]
(Less than 17 Years Experience)	[0.005]	[0.008]	[0.006]
MUCH	−0.0168[1]	0.0040	−0.0143
(More than 35 Years Experience)	[0.005]	[0.008]	[0.009]
FMG	0.925E-2	−0.0116	−0.0155
(Foreign Medical Graduate)	[0.006]	[0.009]	[0.011]
CONSTANT	0.1555	0.0451	−0.1280
R-SQUARE	0.6980	0.6845	0.6728
STD. ERROR	0.0662	0.0778	0.0755
DEGREES of FREEDOM	17/1352	16/799	16/862
F. STATISTIC	183.855	108.389	110.810

NOTES: Numbers in brackets are standard errors.

[1] Denotes significance at the .01 level.

[2] Denotes significance at the .05 level.

Our model of multiperiod pricing also attempted to summarize the nature of Medicare's method of determining reasonable fees. It suggested that if physicians expect reasonable fees to grow at a rate slower than overall inflation, they might respond by increasing billed prices to insure that reasonables would be high later. We tested this hypothesis by including the lagged rate of growth of Medicare reasonables (DR) in our equations. The significant negative sign for DR supports the notion that basing reasonables on past billings did contribute to inflation. This conclusion suggests the value of moving to a policy like the Medicare Economic Index, which weakens the link between past billings and current reasonables, as a mechanism for adjusting reasonable fees.

Finally, a number of personal and community variables were included in the equations to measure cost and demand conditions in local markets. For the most part, these variables were not significant determinants of billed prices, though it appears that large numbers of physicians per capita did exert downward pressure on prices. The latter's quantitative importance is quite small. In general, we believe that the relative unimportance of these variables is due to the fact that the Medicare and Medicaid reasonable fees capture most of the inter-physician variation in costs and private demand levels.

In general, the price equations were consistent with theoretical predictions. Moreover, the equations exceeded expectations in terms of goodness of fit. They provided a good base for analysis of Medicare assignment and Medicaid supply decisions.

Statistical Supply Functions

The estimation of statistical supply functions for Medicaid and Medicare assignment services is motivated by three questions.

1. Is the supply of office-based physicians' services to fixed fee programs sensitive to variations in fee levels?
2. How would the availability of such services be affected by changes in Medicare and Medicaid reimbursement, and what are the implications for cost containment?
3. What was the impact of the ESP on the supply of services to Medicaid and Medicare assignment patients?

In general, the physician's supply decision has two components: first, whether to participate in the program, i.e., to treat a meaningful number of Medicaid or Medicare assignment patients; and second, how many services to supply, given that the physician "participates" in the fixed fee program. This analysis focuses on the latter decision.

Specification of the estimating equations was based on the simple theory of the price discriminating firm. The theory suggested that the basic sample be partitioned in order to identify marginal suppliers in each of the two programs. Econometric considerations led us to choose a log-linear functional form which was estimated over a pooled sample of northern California general practitioners, internists, and general surgeons. Since the physician's billed charge is simultaneously determined with Medicare assignment and Medicaid output, two-stage least squares is the appropriate estimation method.

Our theory predicted that the billed charge should have a negative coefficient and the program reasonable a positive coefficient. The results reported in Table 4 strongly support these hypotheses. Billed price was negative, highly significant, and large in magnitude for both programs. The coefficients for the program reasonable fees were positive and smaller in absolute value than the billed price coefficients. The Medicare reasonable was significant at the one percent level, while the Medicaid reasonable was significant at the 10 percent level. It is also interesting to note that the Medicare assignment decision appears more responsive to relative prices than the Medicaid supply decision.

Table 4
Structural Supply Equations, Pooled Specialties
(Dependent Variable = Log of Quantity of Program Services Supplied)

Participating Physicians Only

	Medicare Assignment		Medicaid	
	OLS	2SLS	OLS	2SLS
Log of billed price	−1.2075[1]	−1.7494[1]	−0.7078[1]	−1.0220[1]
	[0.341]	[0.732]	[0.155]	[0.219]
Log of program reasonable	0.8367[1]	1.3528[1]	0.1272	0.4472
	[0.403]	[0.727]	[0.251]	[0.296]
Experience	0.0032	0.0043	−0.0136[1]	−0.0144[1]
	[0.004]	[0.004]	[0.002]	[0.002]
Foreign medical graduate	0.5361[1]	0.5377[1]	−0.0074	−0.0050
	[0.121]	[0.122]	[0.071]	[0.072]
Mean office salary	0.1209	0.1397	0.0052	0.0091
	[0.086]	[0.087]	[0.034]	[0.034]
Malpractice premium	0.0044	0.1397	0.0187[1]	0.0189[1]
	[0.004]	[0.087]	[0.002]	[0.002]
County population	0.1034E-6	0.1001E-6	0.9551E-8	0.2409E-7
	[0.000]	[0.000]	[0.000]	[0.000]
Physicians per elderly	−0.0251[1]	−0.0259[1]	—	—
	[0.007]	[0.007]		
Physicians per eligible	—	—	−0.0177[1]	−0.0176[1]
			[0.002]	[0.002]
1973	−0.0725	−0.0671	−0.1525[1]	−0.1525[1]
	[0.095]	[0.097]	[0.053]	[0.053]
1974	0.0643	0.0685	−0.0165	−0.0107
	[0.125]	[0.132]	[0.059]	[0.059]
1975	0.0356	0.0769	0.0079	0.0541
	[0.154]	[0.174]	[0.070]	[0.073]
General practice intercept	—	—	0.6867[1]	0.6768[1]
			[0.044]	[0.045]
Internal medicine intercept	0.2735[1]	0.3058[1]	—	—
	[0.090]	[0.090]		
R^2	.1348	.1217	.1684	.1687
Standard error	.6889	.6940	.9137	.9135
N	456	456	2465	2465

NOTES: Numbers in brackets are standard errors.
[1] significant at 1 percent level

Our second question deals with the implications of changes in program reasonables on total costs and the availability of services. Those were addressed with the aid of a simple policy simulation. Using parameter estimates from both the supply and price functions, we calculated the effects on Medicaid supply and program cost of increasing the Medicaid and Medicare reasonables per CRVS unit to the levels of billed charges per CRVS unit in each specialty. Table 5 gives the results of this exercise, first under the assumption that billed charges are constrained at current levels, and then assuming that they increase as predicted by our price equation. Although generalization of the specific quantitative results is not justified, two qualitative inferences appear warranted. First, increasing the Medicaid reasonable fee induces an increase in supply, if other factors are held fixed (Table 5, row 5a). The size of the increase depends on the magnitude of the elasticity of supply with respect to the program reasonable fee.

If, on the other hand, private fees rise in response to increases in program reasonables (as was suggested by our price equation analysis), then some of the gain in program output will be offset by a shift in the supply function. In the example given in Table 5, the jump in billed fees resulted in a net reduction in Medicaid output (rows 5b and 6b). However, total program costs still went up, since the higher Medicaid fee must be paid on all units of Medicaid output. Again, the specific magnitudes of these effects depend on the relative values of the two elasticities and the size of initial differences between the billed fee and program reasonables.

Table 5
The Impact of Equalizing Medicaid, Medicare, and Billed Fees on Medicaid Output[1]

	General Practice	Internal Medicine	General Surgery
A. Private Fees Held Constant			
1. Medicaid fee elasticity (all specialties)[2]		.447	
2. Billed charge elasticity (all specialties)[2]		−1.022	
3. Avg. billed charge[3]	.66	.71	.72
4. Avg. Medicaid reasonable[3]	.52	.52	.55
5a Additional CRVS units per MD	466	339	290
6a Total additional CRVS units[4]	576,547	238,473	120,757
7a Total additional Medicaid payments[4]	$3,542,406	1,205,984	716,237
8. Avg. CRVS units per patient[5]	64	75	104
9a Total additional patients	9009	3180	1161
10a Avg. cost per new patient ($)	393	379	616
B. Private Fees Unconstrained			
5b Additional CRVS units per MD	−206	−126	−115
6b Total additional CRVS units[4]	−254,025	−88,667	−47,660
7b Total additional medicaid payments[4]	$2,994,229	973,715	594,976
9b Total additional patients	−3969	−1182	−458
10b Avg. cost per new patient ($)		(Not defined)	

[1] Medicaid participating physicians only

[2] From Table IV, column 4

[3] Dollars per CRVS unit

[4] Total refers to northern California counties from which physician sample was drawn; estimates are adjusted for Medicaid participation rates

[5] Total Medicaid CRVS units divided by number of distinct Medicaid patients, northern California physician sample.

The logic underlying these inferences can be illustrated with the aid of Figure 1. Panel A depicts the initial equilibrium, with the reasonable fee at r_1. Q_1 units of output are supplied to the program. In panel B, the reasonable is increased to r_2 with all other factors, particularly the billed charge, P, held fixed. Supply increases to Q_2 and program costs go up by the amount $Q_1\ (r_2-r_1) + (Q_2-Q_1)r_2$. In panel C, the supply function shifts upwards and to the left in response to the increase in billed charges induced by raising the reasonable to r_2. This erodes some of the potential increase in supply, so that final output is at $Q_3 < Q_2$. Additional program costs are now given by $Q_1\ (r_2-r_1) + (Q_3-Q_1)r_2$. Note, however, that the difference in additional costs between panels B and C is only $(Q_2-Q_3)r_2$, since physicians still receive the higher reasonable fee for all inframarginal units of output.

Our third issue concerns the impact of price controls on the supplies of services. In general, one might expect price controls to have two types of effects. First, the parameters of the supply function might change if physicians alter their underlying behavior, i.e., the shape and position of the entire function might shift. Second, price controls affect the values of key variables, the billed price, and the Medicare reasonable. This will also influence physicians' supply decisions.

The year variables in the Medicare assignment supply function clearly indicated that the ESP had no effect on the function's parameters. There appeared to have been a statistically significant shift in the Medicaid supply function in 1973. We do not attribute this to the ESP, however, since both 1972 (the reference year) and 1973 were control years. It is more likely that the negative shift reflects the effects of two major changes (a prior authorization program and co-payment experiment) implemented by California Medicaid just before the ESP was announced.

Our simulations of the ESP's effects on supply, therefore, are based on our estimates of what billed prices and Medicare reasonable fees would have been in the ESP's absence. Comparing simulated and observed mean Medicaid output levels (measured in CRVS units) indicates that the ESP had a positive impact on the quantity of care supplied. We estimated that physicians increased their average Medicaid output by between 7.8 and 15.5 percent, depending on specialty and year. This response is explained by the fact that the ESP successfully constrained billed prices. Since Medicaid reasonables were already under strict state control, the net result was to lessen the gap between billed prices and Medicaid reasonables.

The pattern of effects was similar in Medicare assignment for 1972 and 1973. We estimated that between 11.0 and 16.7 percent more services were provided than would have been without the ESP. Again, the explanation is essentially that billed prices were constrained more than Medicare reasonables, thereby reducing the gap between the two. In 1974 and 1975, there was almost no effect on Medicare assignment supply. On the one hand, the end of controls in April 1974 permitted billed prices to move up sharply. At the same time, Medicare reasonables, which were based on billed prices in 1972 and 1973, were still under direct controls in 1974 and the lagged effect of the control program in 1975. Consequently, the difference between prices and Medicare reasonables was not materially affected by the ESP, even though absolute levels were probably somewhat lower.

Conclusions

In this study, we have treated California physicians' experiences under Medicare, Medicaid, and the Economic Stabilization Program as a natural experiment of how reimbursement systems might affect variables such as access and cost. While limiting our study to solo, office-based practitioners in a single state makes generalization of the quantitative results risky, this approach does control for a number of potentially confounding influences. Thus, this section focuses on behavioral rather than quantitative generalizations pertinent to the basic concerns of containing costs while assuring service availability.

Looking first at physicians' fees, several inferences appear warranted. First, a system like Medicare or Medicaid which establishes a price floor, i.e., the program reasonable charge, clearly leads to an increase in average actual charges. In effect, physicians who participate in the program are able to divide their potential patient population into those who are willing and able to pay the physician's total actual charge and those for whom the financing program pays the reasonable charge. Under such a situation, the actual charge is higher than it would have been in the absence of fixed fee programs like Medicare assignment and Medicaid.

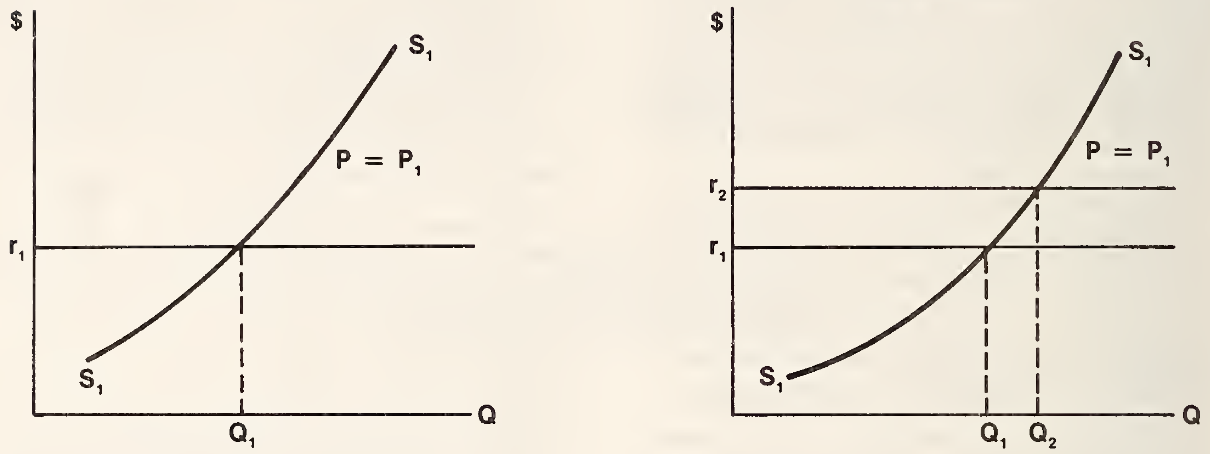
Second, increases in program reasonable charges appear to have positive spillover effects on physicians' actual charges. Thus, either occasional or automatic increases in the fees paid by the financing programs will have an inflationary impact on the charges of physicians who participate in the program. In general, the amount of any reasonable charge increase which is passed through will depend on the nature of the patient demand function faced by the individual physician.

Third, a system which determines reasonable charges as a function of past actual charges has an additional inflationary bias. Physicians will set actual charges at a higher level in the current period in order to attain desired reasonable charge levels in the next period. This suggests that efforts to restrain reasonable charges which preserve the relationship between current charges and future reasonables may be offset by changes in physicians' billing behavior. Thus, for example, redefining Medicare's prevailing charge as, say, the fiftieth rather than the seventy-fifth percentile of the customary charge distribution may produce a one-time decrease in Medicare reasonables. But the ultimate result is a higher rate of fee inflation as physicians respond to the lower reasonables.

Fourth, our analysis of the Economic Stabilization Program suggests that it did succeed in lowering both the absolute levels of billed charges as well as their rates of increase. At the same time, the study provided considerable evidence that constraining physicians' fees is not equivalent to containing either expenditures for physicians' services or physicians' gross incomes.

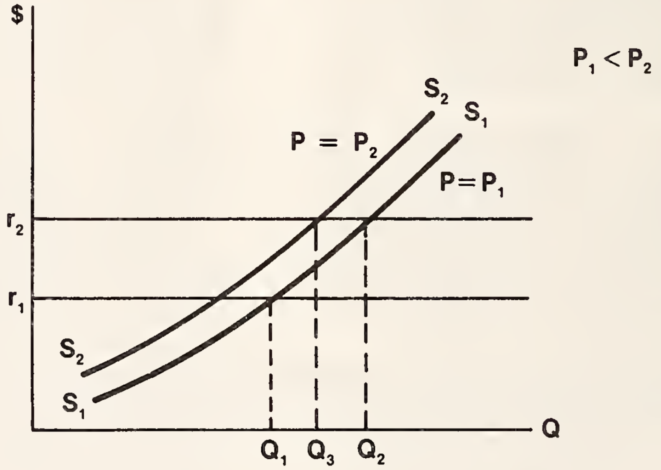
Finally, analysis of physicians' supplies of services to Medicare assignment and Medicaid patients revealed that output allocation decisions are clearly sensitive to the prices physicians receive and that the two fixed fee programs compete with privately insured and/or self-paying patients for physicians' services. Furthermore, it appears that physicians are more sensitive to changes in their private charges than the program reasonable charges.

Figure 1
Graphical Illustration of the Impact of a Change in the Program Reasonable Fee


A. Initial Equilibrium

B. Change in Reasonable, Billed Charge Constant

C. Supply Function Shifts because of Increase in P



Notes:
r = program reasonable fee
Q = units of program output (services)
P = billed charge
SS = program supply function

There were a number of questions which could not be answered with the data available to this study. For example, we could not determine whether the increases in services to the Medicare assignment and Medicaid programs represent a substitution of public for private patients, a shift in the locus of care for public patients, a reduction in the relative proportion of non-assigned claims, the satisfaction of public patients' unmet medical care needs, or the creation of demand by physicians. Nor could anything be inferred about demand creation in the private market. We also do not know whether the additional services provided to Medicare assignment and Medicaid patients were beneficial or unnecessary.

Questions of demand creation, quality, and necessity are best addressed by investigating individual procedures and patient diagnoses. In the absence of data on both physicians' total practice activities and patients' utilization patterns, these questions are very difficult to answer. However, the conclusion that physicians will expand the supplies of services to public programs when private fees are constrained is not inconsistent with the possibility that services will be increased in the private market as well.

Policy Recommendations

Based on the above conclusions, what recommendations can one make about the design of a physician reimbursement system? First, the customary-prevailing-reasonable (CPR) method used to determine payments to individual physicians by Medicare and many Medicaid and private insurance programs should be eliminated. The CPR method preserves large differences in payments to physicians in the same medical specialty and geographic area for performing the same procedure and may be thus inequitable to physicians. It has an inherently inflationary incentive, because next year's program reasonable charge levels are based on this year's actual charges. Lastly, CPR does nothing to increase physicians' willingness to treat poor or elderly patients. It has no effect on, and in fact maintains, the gap between what physicians are paid for treating Medicare assignment or Medicaid patients and what they receive from privately insured and self-paying patients.

A policy like the Economic Index, which limits increases in Medicare prevailing fees to a value determined by national rates of growth in physicians' costs and incomes, eliminates at least two of the problems associated with CPR fee determination methods. The Economic Index largely severs the link between current actual charges and future reasonable charges, thus removing one source of inflationary pressure. Second, if physicians' customary and actual charges increase at rates which exceed the limits imposed by the Economic Index, then the area's prevailing fee for each procedure will eventually become the reasonable charge for all physicians in the area. This effectively eliminates disparities among physicians in what Medicare will pay for an identical procedure.

However, these two improvements in the reimbursement system are likely to come at the cost of a reduced willingness to treat Medicare assignment and Medicaid patients. Since the Economic Index constrains Medicare reasonable charges to grow at a rate generally below the rate of increase in actual charges, the gap between public and private fees must inevitably widen. Our analyses strongly suggested that this would have an adverse effect on the quantities of care supplied to Medicare assignment and Medicaid patients. (Medicaid is also affected, since the Medicaid program is prohibited from paying more than Medicare for any given service). Furthermore, the Economic Index still allows automatic, annual increases in reasonable charges, albeit smaller than what would occur under a CPR system. Since these increases amount to raising the price floor faced by physicians, they will add to inflationary pressures on actual charges.

These observations lead to our second and third recommendations. Fees should be uniform for all patients and should not be allowed to increase solely at provider discretion. A reimbursement system which perpetuates a fee differential between public and private patients clearly invites discrimination in favor of the higher fee patient. Like anyone else, physicians prefer to be paid more rather than less for an identical service. Thus, if public policy truly desires to provide equal access to office-based physicians' services, it seems that equal fees for all patients would be called for.

Our analysis of physician pricing, however, suggests that periodic attempts to eliminate the differential in fees by raising public payments would lead to higher physicians' charges and expenditures in what might be an ever unsuccessful game of "catch-up." Both of these observations inevitably lead to the recommendation that either structural changes or additional policy instruments are needed. Maintaining the availability of services to the poor and the elderly calls for equalizing fees. Limiting fee inflation and/or total expenditures requires separate controls on either all fees, or physicians' gross or net incomes. The most obvious mechanism for limiting fee inflation is the use of a uniform fee schedule which cannot be increased without agreement of some public authority. Such a fee schedule may vary among specialties and locations, but should treat all patients uniformly.

Our results also suggest that fee controls by themselves may not effectively limit undesirable growth in expenditures on physicians' services, at least over a short time period. There were major differences between the price control and non-control years in the quantities of several types of services (such as office visits for established patients, electrocardiograms, injections, radiology procedures, and pathology procedures) which many believe could be manipulated by physicians for revenue-generating purposes. Such shifts in the quantity of services provided are consistent with views that physicians can influence demand. We note, however, that over the long run, continued opportunities for demand creation are likely to be limited and, secondly, the supply of physician effort itself may be sensitive to the imposition of permanent fee controls.

Both the potential short and long term consequences of a fixed fee schedule lead to our fourth recommendation: other policy instruments in addition to the fee system are needed to monitor and evaluate the quantity, mix, and quality of services provided. Although determining the nature of such instruments is beyond the scope of this project, one can point to utilization review systems and Professional Standards Review Organizations as potential partners with a uniform fee schedule in a physician reimbursement plan. Another possible policy links annual fee increases to average rates of growth in physicians' net incomes. If incomes increase at a rate greater than the one anticipated, then fee increases are reduced according to an agreed upon formula. Systems of this type are currently in operation in West Germany and Quebec, Canada. Their experiences should be studied.

Finally, we recognize that fee negotiations and systems to monitor the quantity of services provided require substantial data gathering and analysis efforts. This study demonstrated very clearly that price indices are highly sensitive to the number of procedures used in constructing them. Price indices using base year service weights are subject to major errors because physicians make substantial changes over time in the services they perform. Procedures change quite significantly in their relative importance within a specialty. Likewise, no one set of procedures is useful for developing indices for more than one specialty. The problem is particularly serious with surgery, laboratory, or radiology procedures. Physicians provide small quantities of a large number of different procedures in these categories. As a result, a large number of procedures must be used to calculate meaningful price indices. For the same reasons, it is critical that a large number of different procedures be used to analyze shifts in the volume of surgery, radiology, and pathology services. For example, we found in the course of the present study that analysis of 200 procedures was not adequate to accurately determine changes in surgery and radiology services and revenues. As a result, we used the entire universe of procedures. Our final recommendation, therefore, is that an essential by-product of the physician reimbursement system be an ongoing data collection program which promptly and accurately records services provided and payments made. As has been demonstrated by the Canadian experience with paying physicians, information generated by the payments system is critical both to the negotiating and monitoring processes.

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Questions and Answers

Question: Do you interpret the increased quantity of services during the Economic Stabilization Program as a substitution of private patients for Medicare patients, or is it induced demand? My understanding is that during wage/price controls, private insurers were not as stringent in constraining reimbursement levels as were Medicare and Medicaid. What may be interpreted as substitution could be demand creation instead.

John Holahan: If there were demand creation, it might be difficult to explain why it did not occur in 1975 as well as in 1974 and 1973. There is some indirect evidence which indicates that the physicians' total earnings were lowered during the price control period.

Comment: During the Economic Stabilization Program, the restrictions on fee increases applied to all physicians. Blue Shield, as well as commercial carriers, paid on the basis of what the charges were, as submitted by physicians. Some of the plans required that physicians assert in writing that their charges were compliant with the regulations. There was no enforcement rule for administration of public programs or our own private business programs. The burden of imposition of the controls was on the physicians rather than upon the carriers.

Comment: It is very difficult to extrapolate beyond what we studied, and it is probably best to be somewhat cautious about doing that. Medicare patients are somewhat better insured for services such as office visits and lab tests, the services that were found to increase the most. I think we would be very reluctant to extrapolate to what was going on in the private market.

Question: What was the underlying model of the study?

Jack Hadley: It was a very simple and fairly standard model of the private discriminating firm, almost identical to the one Frank Sloan discussed earlier. It was assumed that the physician is a local monopolist in the private market and faces two fixed fee price schedules which are, at least contemporaneously, exogenous. The schedules compose the mechanism for price discrimination in the sense that there is more than one transaction price.

Comment: You might recall from standard economics that monopolists have a supply point, not a supply curve.

Comment: There are inter-marginal producers for whom the supply function, at least the marginal cost function, cannot be identified. We did not consider any supply of effort effects. We did two-stage estimations. Those were a little less reliable because the instruments that we used to compute the predicted billed charges were largely identical to the reduced form price equation.

Question: How would you respond if Bob Derzon and Clif Gaus were still here and came up to you and said, "Given that you've been doing this study for a couple of years and our objectives are to minimize unnecessary care while at the same time maintain reasonable rates of increase in prices that we pay physicians for services, what do you recommend we do to change our current reimbursement policies?"

Robert Lee: My suggestion would be that you probably can't get all that with reimbursement policy. Three or four different objectives cannot all be reached through the reimbursement mechanism.

Question: Two years of work and that is all you can say?

Robert Lee: We also confirmed that physicians charge high prices.

Comment: That is a serious question because what we have to do is consider how to translate the results of our studies and what is coming out of the other studies into some reasonable approaches. It is an issue for Medicare, but it is also an issue for Medicaid, where the problem may be more critical.

John Holahan: There is one sort of policy conclusion that we have talked about, and that is the fact that controlling physician expenditures is much more complicated than just controlling physicians' fees. Several provinces in Canada and West Germany have tried to control the rates of fee increases to changes in physicians' incomes, and it is my understanding that they have had a considerable amount of success. We need to monitor changes in physicians' incomes or else undertake effective utilization control.

Question: Are you defining physician's income as net or gross? If it is gross income I find fault with the line of thinking.

John Holahan: The Canadians and West Germans have attempted to assess changes in net income for an aggregate of physicians.

Question: Was there any shift in the proportion of routine office care for Medicare patients?

John Holahan: Are you asking whether that shifted over time to a different mix of office visits or hospital visits, for instance? It did. We found roughly a 2 percent and 3 percent increase each year in the composition. In no way did the change seem to be related to price controls. It continued on after controls were lifted and appeared to be a trend rather than a jump related to the imposition of controls.

Question: You measured access to care mostly in terms of supply. How can supply be translated into access to care of recipients? Do you think that when the supply of services is increasing, the same recipients receive more services or that more recipients receive those services?

Jack Hadley: We are talking about physicians' willingness to supply services. Whether that can be translated into their getting new patients or giving more services to the same patients, or whether demand or utilization are there, we are unable to say.

Canadian Physicians' Supply Response to Universal Health Insurance: The First Five Years in Quebec (Preliminary Results)

by Charles Berry, Philip J. Held, Barbara Kehrer, Larry Manheim, Uwe Reinhardt

In general terms, the objective of this study has been to explore how physicians and their patients have fared under universal health insurance coverage introduced in November 1970 in the Canadian province of Quebec.

Toward this end, we analyzed the location choices of physicians in the province, the organization of private medical practices, and the utilization of physician services by empirically testing interesting subsets of the Quebec population. Our research efforts employed both time-series and cross-section analyses. The objective of the time series analysis was to trace the longer run impact of universal health insurance coverage on the level and composition of physician output and on the use of physician services by beneficiaries. Data for these analyses cover the period from January 1971 (soon after the onset of universal coverage) to December 1975. The unit of analysis in these studies is either the "representative physician" or the "representative beneficiary," with the "representative individual" being characterized by market area or time period averages of pertinent variables.

Description of the Data

The analyses of this project were based on several data sources:

Regie de l'assurance maladie du Quebec (Regie)

The universal health insurance plan in Quebec is basically a fee-for-service system with a fixed fee schedule negotiated by the provincial government and the two professional organizations representing general practice and specialist physicians, respectively. In the operation of the plan, a record is generated for each service delivered by physicians. The basic data files for this project are based on samples of the approximately 180 million medical services delivered between 1971 and 1975. The samples were designed to produce two types of records, one in which the unit of analysis is the physician and the second in which the unit of analysis is the beneficiary. The samples were stratified by year (1971–1975) and location (the province was divided into 65 market areas). In addition, the beneficiary sample was stratified by family income (chronic low income as indicated by welfare status and not low income) and age and sex (five reasonably narrow separate age-sex groups).

Primary Data from a Telephone Survey of General Practice Physicians

A telephone survey of approximately 2,000 of the province's general practice physicians was conducted in the spring of 1977. The survey collected data on the general organization of the physician's office, visit rates, inputs of physician and non-physician time, as well as measures of queues to appointments. Confidentiality restrictions precluded merging telephone survey data with physician profile data maintained by the Regie.

Summary of Major Findings

The Distribution of Physicians

During the period 1971–75, the ratio of active physicians to population in Quebec increased at an average annual compound rate of seven percent. This is more than seven times the comparable growth rate in the United States. Graduations from Quebec medical schools contributed 45 percent of this growth. About 23 percent was contributed by the inflow of foreign-trained medical graduates, another 24 percent by Quebec-trained physicians hitherto not active in direct patient care, and about eight percent by medical schools elsewhere in Canada.

The number of active general practitioners in Quebec grew relatively more rapidly than the number of specialists, a trend not found in the United States. As a result, the percentage of general practitioners among all active physicians in Quebec grew from 39 percent in 1971 to 41 percent in 1975.

The rapid increase in the physician-population ratio brought with it a commensurate increase in the use of physician services per beneficiary. Total payments for physician services per capita (at a constant fee schedule) rose from $32 in 1971 to $44 in 1975—an average annual compound rate of 9 percent. Total payments per active physician rose at an annual rate of about 2.3 percent. To what extent this increase in per capita utilization of services represents successful satisfaction of hitherto unmet demand cannot be ascertained from these data.

The rather sharp increase in the overall supply of physicians in Quebec does not appear to have had a marked impact on the relative geographic distribution of physicians. The number of all active physicians per capita

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was unevenly distributed across market areas, in both 1971 and 1975. Although a comparison of the distributions of physicians and population suggests a slight secular movement toward greater equality in the distribution of physicians, it is fair to say that the relative geographic distribution of physicians in 1975 was basically similar to that in 1971.

In terms of absolute numbers of physicians per capita, almost all market areas experienced some positive growth during the period. Areas in which the physician-population ratio actually declined tended to be rural areas experiencing secular decline in population. Relatively more rapid growth in the ratio tended to occur in suburbs of the larger cities, although several rural areas also experienced above-average growth. Large urban centers did not register above average growth in physicians per capita.

An analysis of physicians' locational choices suggests that, other things being equal, the average gross payment for general practitioners in an area tends to exert a positive effect on the migration flow of general practitioners although the *magnitude* of the estimated effect appears to be sensitive to the specification of the model. The migration pattern for specialists was more difficult to categorize.

Practice Organization

An analysis of how a general practitioner practices in Quebec revealed a marked difference between the typical medical practice in Quebec and its U.S. counterpart. General practitioners in Quebec appear to employ only about a third as many aides per physician as do U.S. general practitioners. Although they appear to work roughly as many hours per week and year as their U.S. colleagues, they spend substantially more time per patient visit at the office and therefore see only about 60 percent as many patients per hour or week as do their American colleagues. Finally, the average number of days wait time to an appointment with a general practitioner in Quebec appears to exceed the comparable U.S. figure by 60 to 100 percent.

Several possible explanations as to why Quebec general practitioners employ fewer aides than their U.S. counterparts include the fact that Quebec general practitioners do not usually operate laboratories in their practices and that billing under the Quebec insurance system is fairly simple, obviating the need for some clerical personnel. An additional factor appears to reside in the fee schedule. Apparently, the level of the fee schedule and the application of rules requiring physician presence discourages delegation of medical tasks from physicians to auxiliary personnel.

Within Quebec there is substantial inter-physician variation in variables such as physician hours worked per week, weekly and hourly patient visits, aides employed per physician, and so on. An analysis of variance indicates that the factor "geographic area" (i.e., market area) is statistically significant, although it is difficult to discern any systematic pattern among market-area averages of the variables.

In the United States, the hourly and weekly rates of patient visits handled by physicians tend to vary inversely with relative physician density. This pattern is not nearly as discernible in Quebec. If market areas are grouped in terms of relative physician density, there is no discernible difference in weekly patient visits per week, nor are there systematic differences in other practice variables. If one controls more carefully for an entire set of factors, though, to affect weekly visit rates, physician density does appear to have a positive impact on weekly visits (other things being equal), although this association is quite weak. In other words, the data suggest that physicians in areas with relatively few physicians per capita give their patients just as much time per office visit as do physicians in areas with relatively high physician density.

In comparison with U.S. general practitioners, relatively more Quebec general practitioners belong to group medical practices. A production-function analysis of the telephone-survey data suggests that, other things (practice-inputs) being equal, group practitioners in Quebec would tend to see about nine percent more patients per hour or week than solo practitioners with identical practice inputs. In fact, however, group practitioners in Quebec appear to employ significantly fewer aides per physician than do solo general practioners, and the *actual* average weekly office visit rate for general practitioners in groups is somewhat higher than that reported by solo general practitioners. An economic evaluation of the production-function estimates supports the conclusion that solo general practitioners in Quebec employ more aides, on average, than would be required strictly to maximize net income. The analysis suggests that, given the technology of medical practice in Quebec, and given the wages and fee schedule faced by physicians at the time of the telephone survey, the economically optimal number of aides per full time equivalent physician is actually less than one full-time equivalent aide.

Composition of Physician Output

An analysis of the changes in the configuration of physician output over the period 1971–75 shows that average quarterly gross payments (for January-March) per active general practitioner in Quebec rose by 13.4 percent, or 3.2 percent per year, while that of general surgeons rose by only about two percent, or 0.5 percent per year. Since average annual gross payments by *all* physicians over the period grew at a rate of about 2.3 percent, it can be reported that the relatively rapid increase in the physician-population ratio during this period did not depress the average gross income of the representative (average) physician in Quebec.

There appears to have been, however, a discernible shift in the composition of physician output. For both general practitioners and general surgeons, the average number of patient visits and consultations per physician *decreased* by roughly five percent per year, while total gross payments per visit or consultation *increased* commensurately. In other words, there appears to have been a discernible shift towards more resource-intensive patient visits over the period. There also appears to have been a marked shift from ordinary examinations to the more costly complete and major complete examinations. There was not, however, a substantial shift in the priority of surgical procedures. The performance of lower priority surgical procedures as a proportion of total payments declined for both general practitioners and general surgeons.

An analysis of the effects of time and of maket area variables on aggregated and disaggregated levels of physician output showed that, controlling for a variety of market-area variables that influence the level and composition of output, total payments to general practitioners for all services and total payments for all visits *increased* by 15 and 20 percent. However, total visits per general practitioner decreased by nine percent. In 1971, total payments and visits to general practitioners tended to *decrease,* with average household income in the physician's market area, other things being equal; by 1975, the sign of this relationship appears to have been reversed.

Finally, other things being equal, the effect of relative physician density in a market area on the level and mix of physician output was found to be generally small. Although physician density does appear to have some negative effect on output and payments per physician, the conclusion seems warranted that the dollar value of output per physician remained relatively constant as the number of physicians in a market area increased. We came to this conclusion by analyzing physician gross payments over time (with rapidly increasing overall physician-population ratio) and analyzing physician payments across market areas at any point in time.

Such maintenance of total output (and payment) levels in the face of increasing physician-population ratios implies commensurate increases in physician services rendered per capita.

Medical Utilization Per Capita (All Services)

A closer examination of physician services per capita was conducted by analyzing medical utilization for selected age-sex groups among beneficiaries (males between the ages of five and eight, and females between the ages of fifty-eight and sixty-one). These per capita utilization rates were related to market-area characteristics, such as physician density and area mean household income, and to the income status of the individual beneficiary. The results from this analysis reveal that for a wide range of physician services, the chronically poor were already receiving in 1971–72, substantially more services per capita than did the non-poor. This situation does not appear to have changed over the period of 1971–75.

While the per capita utilization of surgical procedures increased as the number of physicians per capita increased (at less than one to one), there were no substantial shifts in the composition of these surgical procedures towards lower priority surgical procedures. Combined with the previously reported decreases in lower priority surgical procedures *per general surgeon*, it is fair to say that, while the physician supply per capita in Quebec increased dramatically between 1971 and 1975, we did not observe shifts towards the lower priority surgical procedures we had selected for analysis.

After controlling for the income status of beneficiaries within an area, it was found that beneficiaries in higher-income areas have often increased their use of physician services at a faster rate than have beneficiaries from lower-income areas. Thus, the Quebec health insurance system does not appear to have effected a *relative* redistribution of medical services from high-income to low-income areas. It may have done so shortly after the introduction of Quebec Medicare, but since then, the trend, if there is a trend, has been more nearly in the reverse direction.

In reacting to this finding, however, it is well to keep in mind that, in terms of the *absolute* number of services per beneficiary, virtually all market areas show substantial increases over the period 1971 to 1975. The increases, it will be recalled, attended the substantial growth in the physician-population ratio almost everywhere in Quebec.

Medical Utilization Per Capita (Essential Hypertension)

The analysis of utilization included a more narrowly focused study of a subset of beneficiaries who, at one time, had been diagnosed as having suffered from essential hypertension. In many respects, the results parallel the patterns of overall use reported above, but there were also some differences.

For the subset of hypertensive beneficiaries, it was found, once again, that low-income beneficiaries receive relatively more services per year than do non-poor individuals, and they also receive more visits per year. This was true, holding constant, among other things, beneficiary age, sex, location and a proxy measure of health status. Costs per patient year were relatively higher if the physician was a specialist, rather than a general practitioner.

As was reported above, total cost per visit has increased significantly over time for all groups of beneficiaries. Similar cost increases were found for hypertensive visits.

An analysis of annual visits and costs per beneficiary across market areas suggests that relative physician density does not have a pronounced effect on either cost per patient year or the revisit rate. The general practitioner-population ratio of a market area does appear to have a *small* positive effect on both annual visits and costs. On the other hand, the specialist-population ratio appears to exert a negative influence on both variables, other things being equal.

Further analysis showed that the higher cost per patient year for low income hypertensives was decreasing during 1971–75, compared to the non-low income beneficiaries. This result differs from the general utilization of all medical care, as reported above, wherein the differences between low income and non-low income persons remained relatively unchanged between 1971 and 1975.

Although beneficiaries with essential hypertension residing in high income areas (holding constant family income) tend to have higher costs (and services) per year than do beneficiaries in low income areas, the difference did not appear to increase over time. In other words, contrary to the general utilization results, when examining utilization for one specific diagnostic condition, it does not appear that persons in high income areas have increased their relative utilization, compared to beneficiaries in low income areas.

Questions and Answers

Comment: Some of the findings in this study have to be related to the fact that increases in earnings by these doctors, especially general practitioners, were held back because we entered into a three-year negotiation period. When this was concluded, the doctors received increased income retroactively. We have quite a changed situation right now. We have a broader base of data available now and we are preparing a summary of this which will be available in a few months.

Comment: Just a couple of points to reinforce. There was a point made that the physicians' income increased by 3% per year in nominal terms. But in real terms, that is a decrease. By real terms, this means that, due to inflation, income brought fewer shirts and shoes and steaks. But if you deflate by the physician fee index, which did not change at all, this income growth in nominal terms reflects growth in real services delivered. That was a point that could have been misunderstood. The other point is this: It isn't clear from the study to what extent national health insurance per se actively equalized access. When one looks back to 1971, there was already a fair degree of equality in the distribution of physicians and in access to services. What one can say is that it certainly hasn't hurt and probably has helped in the direction of equalization.

The other point is a methodological one. It is fascinating to find that, in the case of hypertensives or in other cases, the service intensity of the treatment doesn't seem to increase much. The elasticity was .1, and I think that is rather small. But if you had to bet your head on this statistic and you were wrong, then you would get your head chopped off. You would hedge. I think one might want to hedge because one doesn't know what would happen if in a given region the supply doubled.

Question: Was the fee structure set up in Quebec uniform across rural and urban areas?

Philip Held: The fee schedule was fixed at constant fees not only between rural and urban areas but between specialists and general practitioners. The fixed fee schedule did not change over the five years of our study, although there have been recent changes in the fee schedule. There have been increases in fees for general practitioners. Also, there is more of a physicians' income policy that sets limits on how much a physician can earn in a quarter. The government is trying to limit the gross earnings of physicians by limiting the amount of billing in a quarter. When a physician's billing in a quarter exceeds its preset limit, the physician is reimbursed at a fraction of the fee schedule.

Comment: The question was asked why national health insurance did not have the impact that was expected. There is one point concerning the mentality of the people in Quebec that may have been overlooked. These people have been undereducated and tucked away for a few hundred years. Despite over half a million dollars spent on media, it had no impact. The people very slowly realized they could go to the doctor for free. They were most reluctant. They would go to a hospital only to die or to a doctor when it was very serious. When it comes to fee schedules for hospital costs, you have to start somewhere. In the beginning, there is little chance of establishing schedules that are just and relate properly to their relative values. We accepted a level for the fee schedule, and that was a quickly negotiated base in the various provinces, initiated by the Federal government. It started with a strike of two weeks by all doctors. Then they came back slowly. On this basis, they adapted to the inevitable. During the next three years, two union-like doctors' organizations were formed. Now there are many organizations involved and negotiations to make changes. Limits were attached and review periods established. The doctors, as an organization, change the values of their fee schedule in a way that equalizes total earnings. But many are concerned about the consequences for quality of care.

Question: Do you have data on the total number of people classified as having hypertension in 1971 and 1975?

Philip Held: Yes, we did take a look at that specific question for four selected age-sex groups. The prevalence rates compared with U.S. data reasonably well.

Question: Did prevalence rates rise in 1972?

Philip Held: Yes, not dramatically, but they did go up.

Comment: Part of the problem in doing a comparative study of a single disease over a time period is that the label that is applied changes meaning. One conceivable explanation of why there was seemingly no rise in utilization by people with this disease, is that more people with relatively mild hypertension were being labeled as hypertensive. The VA studies appearing in 1967 and 1970 announced that hypertension was becoming more prevalent. This illustrates some problems of trying to draw a conclusion over time, about the way one particular disease is treated.

Question: Did you examine the possibility of physicians separating a lab test from a routine office visit for a separate billing?

Philip Held: To examine that I would literally have to know what was done. All we have is what was reported to be done. If a physician did *x* service and bills *y*, we had to assume that y was done.

Question: Do you know anything about overall net income?

Philip Held: There is a physicians' income series published by the Canadian Revenue Service but we had no access to those data.

Question: Was there a uniform schedule of urban and rural rates prior to the time the program was initiated?

Answer: There was a uniform schedule, but it was never enforced because the rural population didn't have the money. Even though there was a suggested schedule which was uniform, the physicians charged quite a bit less prior to 1971. When the study began, the income went up for the general practitioner in a rural area.

Comment: Rural general practitioners made about 12 percent more than urban general practitioners in the first year of the plan.

Question: Why did less active or non-active physicians become more active in such great numbers if net average income in real terms was declining? Would you ascribe that increase as some kind of jump immediately from 1969 to 1971?

Philip Held: I don't think we know. We are reasonably certain there are no errors in the program. The whole issue of bad debts went out the window and, in Montreal, physicians can rent offices by the hour. The office is staffed and equipped so it is fairly easy to be a part-time doctor.

Question: Are there any changes being made in the way malpractice is handled?

Philip Held: Malpractice is still a fairly dormant issue.

Comment: Malpractice is not the problem it is in the U.S. There is a Canadian protective agency which charges physicians $50 or $100 a month, and provides legal aid. I also think Canada has a low lawyer population.

Question: In defining the physician visit rate, the number of visits per individual does not vary with the physician population rate. Does that mean the number of visits per capita must increase when there are more physicians?

Answer: Visits did not go up that much over this period.

Question: Cross-sectionally, does that mean the visit rate is independent of the physician population ratio? Does that mean you crossed areas for hypertension, with no relationship?

Philip Held: Basically, yes. The elasticity of the visit rate per year with the physician to population ratio was quite low. For general practitioners, for example, the elasticity was a positive 0.08.

Comment: The unions in Quebec have a tremendous effect on the labor force. Ninety-nine and nine-tenths percent of all hospital employees are unionized. We have a minimum wage of $3.27 in Quebec. The unions have had an impact on their members.

Question: The services of the hospital based physician were signed officially by the hospital and then were reimbursed by the national insurance payer commission, which in turn billed the hospital. Is there an additional step where the hospital is then reimbursed by the national insurance for their costs?

Answers: In order to have a central monitoring and clearing house type of agency to keep track of the total overall remuneration of a given physician, it was decided that the doctors should put in claims as if they had their own office. The commission gets reimbursed by the hospital in certain intervals. The hospital also receives advanced payment in its budget from the government.

Virginia Physicians' Response to Changes in Coding Terminology

by Alan S. Newman and Paul F. Lilienkamp

In October of 1975, the Virginia Medical Assistance Program (VMAP) converted its procedure reporting nomenclature from NBS (National Blue Shield Physician Treatment Codes) to CPT2 (Current Procedure Terminology, 2nd Edition). This conversion occasioned the basis for our research. We tested the idea that a change to an "unpackaged" procedure coding system would lead to higher charges for physician services and increased program costs. We based our conclusions on data which included six months of claims disposition and claims history data prior to the conversion, and on one year's worth of identical data following the conversion. The hypotheses tested were based on Sobaski's 1975 study which suggested that ". . . a more detailed scale of values could give doctors the opportunity to minimize the number of lower valued services performed and reported, and increase the number of higher valued items" (Sobaski, 1975). We expected that the Virginia Medicaid program's conversion would alter the manner in which participating physicians bill for services and that these changes in billing would be reflected in several indicators of system performance.

The specific changes anticipated and the actual findings are summarized below:

1. The anticipated selection of higher priced procedures should have resulted in:
   - —More claims submitted after the conversion than would have been predicted by system growth. In fact, about 4.5 percent more claims were processed than predicted on the basis of pre-conversion trends. Three percent of this increase occurred during the six month "transition effect" period immediately following the conversion.
   - —Proportionately fewer claims approved, due to inappropriate billings. Instead almost 4 percent *more* claims were approved during the 6 month "transition" immediately following the conversion. During the entire period covered by our research, this percentage has fallen to about .7 percent above the pre-conversion trend for approved claims.
   - —Higher total payments than would be predicted by system growth and inflation. Although actual dollars paid increased from the pre- to the post-conversion periods, these values were 9.3 percent below the seasonally adjusted predictions based on the pre-conversion trend. Figure 1 demonstrates the degree to which payments deviate from their pre-conversion prediction interval. These findings provided the first intimation that the conversion may not have had the effect dictated by our hypothesis.

Figure I
Moving Averages for Dollars Paid per Approved Claim and Values Calculated for 95% Prediction Interval for Pre-Conversion Trend

2. Difficulties in using the new system would be reflected in claims disposition indicators, including:
   - —A higher rate of claims *rejected*. The number and proportion of rejected claims increased dramatically in the months immediately following the conversion, but the number of rejected claims later resumed and fell below pre-conversion levels. The initial increase, however, was sufficient to push the total number of rejected claims 34 percent above the trend predicted on the basis of the pre-conversion pattern. By the end of our post-conversion period this percentage had fallen to 14.5 percent and appears to be still falling. (Figure 2).

Figure 2
Moving Averages for Percent Claims Rejected and Values Calculated for Prediction Intervals for Pre-Conversion Trend

   - —A higher rate of claims *pending*. The number of pending claims did not increase to the extent predicted by pre-conversion trends. Nor did the proportion of pending claims exceed pre-conversion levels.
   - —A higher rate of claims *denied*. The number and proportion of denied claims were not affected by the conversion. In fact, there were proportionately fewer denied claims during the 13 months immediately following the conversion than prior to the conversion.
3. The propensity to choose higher priced procedures was expected to be reflected in higher charges and payments per approved claim. The data, however, did not fulfill these expectations.
   - —While the absolute value of physician *charges per approved claim* was 13 percent higher during the post conversion months, the increase fell 13 percent short of amounts predicted on the basis of highly consistent pre-conversion trends.

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Figure 1
Moving Averages for Dollars Paid per Approved Claim and
Values Calculated for 95% Prediction Interval for Pre-Conversion Trend

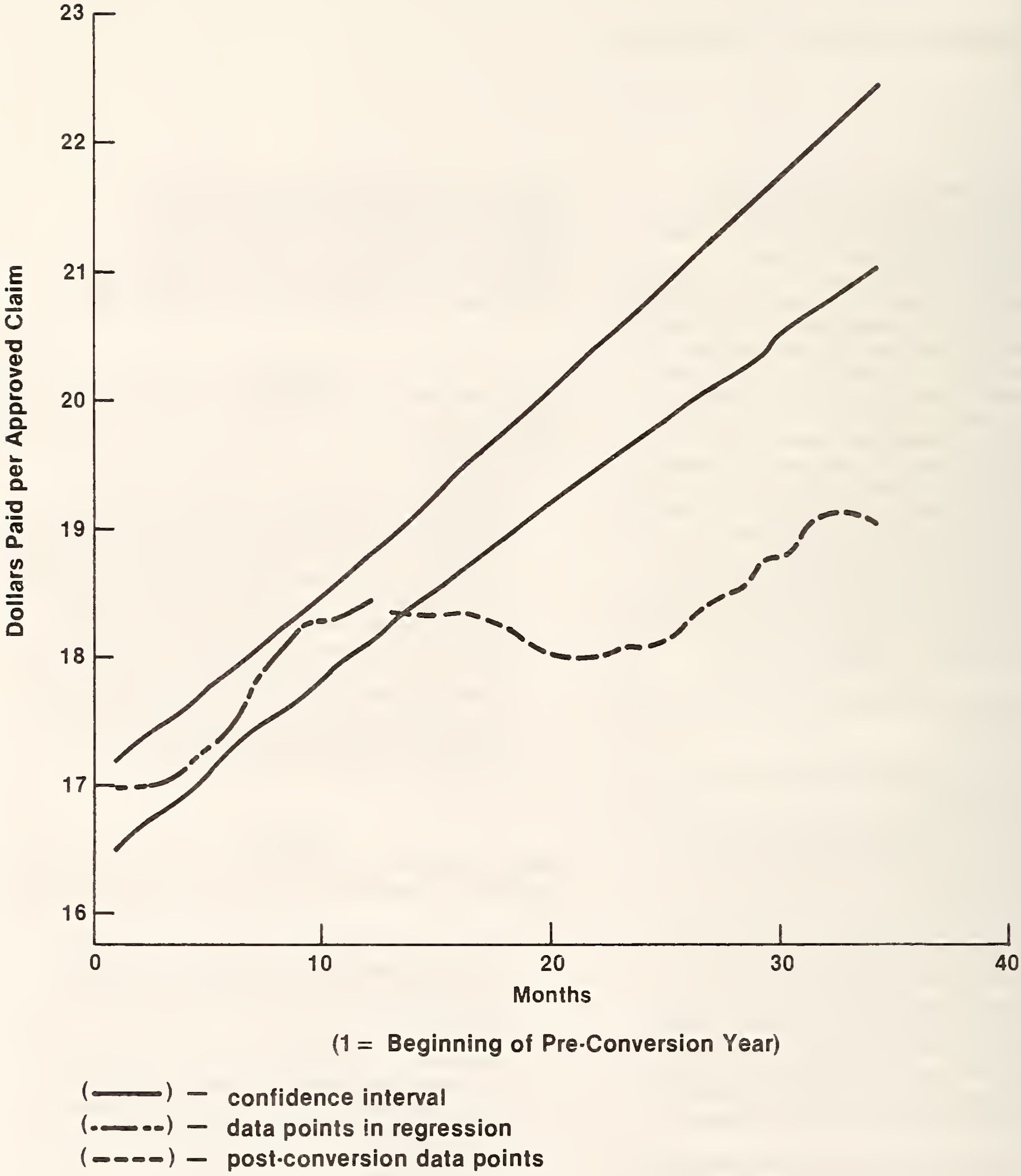

Figure 2
Moving Averages for Per Cent Claims Rejected and Values Calculated for Prediction Intervals for Pre-Conversion Trend

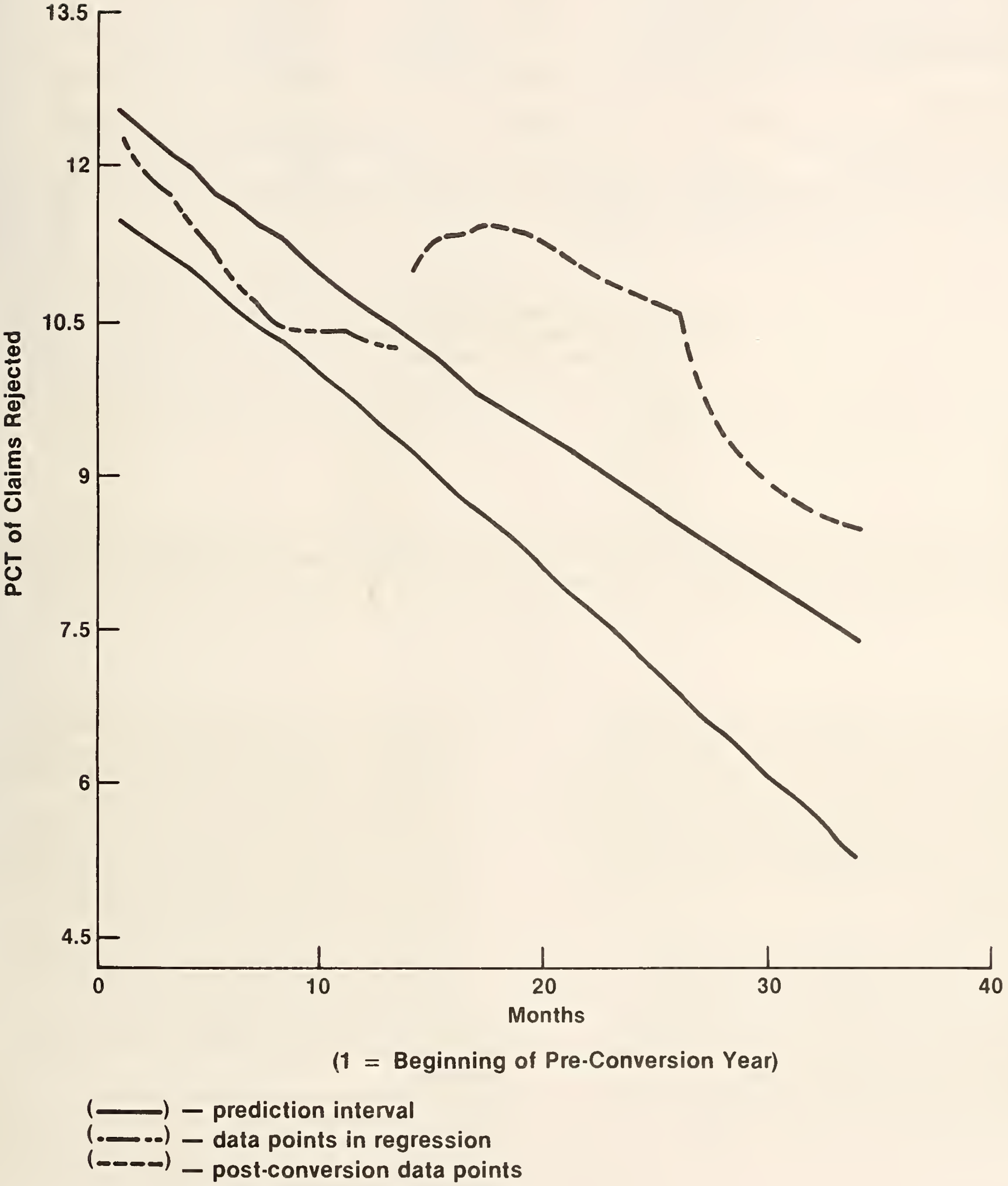

Table 1
Virginia Medical Assistance Program Claims Data

	Pre-Conversion	Transition	Post-Conversion	Latest
% Approved	78.6	75.2	81.2	80.5
% Rejected	10.2	12.2	8.6	9.1
% Denied	4.6	4.2	4.2	4.1
% Pending	6.1	7.8	5.5	5.9
$ Charged per Approved Claim	$22.77	$22.39	$25.76	$26.63
$ Paid per Approved Claim	$18.39	$17.31	$19.10	$18.79
% of Charges Actually Paid	80.8	77.3	74.1	70.6

Table 2
Payments per Procedure Occurrence by Area Under CPT And NBS

	NBS	CPT	% Increase
Surgery	$84.84	$95.71	12.8%
Radiology	9.29	10.23	10.1%
Pathology	4.12	4.52	9.7%
Medicine	10.68	11.04	3.4%
Total	$12.59	$12.83	1.9%

* "Degree of unpackaging" refers to the number of specific CPT procedures that have replaced *equivalent* NBS procedures. Thus, we would expect payment per procedure occurrence to increase (from the pre- to post-conversion period) as the number of procedure choices increases.

—*Dollars paid per approved claim* increased three percent during the post conversion period. This increase, however, is 12 percent less than amounts predicted on the basis of pre-conversion trends. For the two years prior to the conversion, payments per procedure were increasing at a rate of nine percent a year. Since the conversion, (eliminating the six month transition effect period) this rate has fallen to -1.5 percent.

Consider the dollars *paid* per approved claim in relation to dollars *charged* per approved claim. Proportionately fewer dollars were paid per dollar charged for an average claim during the post-conversion period. In other words, the conversion maintained and widened the gap between charges and payments for the average claim.

Table 1 summarizes VMAP claims data from 1 year prior to the conversion through the present.

4. The *degree of unpackaging* for each category of physician service was expected to correlate with changes in payment per episode of service delivery ("procedure occurrence"). The "degree of unpackaging" was determined to be unrelated to observed changes in dollars paid per procedure. The fact that more CPT procedures were available to describe a service formerly encompassed by fewer NBS procedures did not imply an increase in payment. During the six month transition period payments per procedure dropped from $12.59 to $12.33. By the end of the first year payments per CPT procedure had increased to $12.83.

Payments per procedure increased within each type of medical service (Surgery, Radiology, Pathology and Medicine).

The increase in total payment per procedure (1.9 percent) is small when compared to the changes within each of the four specialities. This finding is the result of a *shift* in the relative usage of procedures among areas. Tables 2 and 3 summarize the distributions of procedure occurrences under the two coding systems.

Table 3
Distribution of Procedure Occurrences

	NBS	CPT
Surgery	4.71%	3.74%
Radiology	9.71	9.44
Pathology	21.71	20.03
Medicine	63.80	66.79
Total	100.00%	100.00%

Summary and Conclusions

The findings presented above along with the data contained in our complete reports, suggests the following conclusions:

—After the initial turmoil caused by the mechanics of the conversion, the system has operated more smoothly than before (i.e., fewer pendings, rejections, and denied claims).

—After initial fluctuations, payments per claim have leveled off at a point below pre-conversion projections.

—Charges per claim have maintained an upward trend.

—The conversion to CPT increased payments per procedure—particularly within the area of surgery.

—However, when the changed "mix" of procedures is taken into account, there is a net increase payment per procedure of only 1.9 percent. Thus, while the conversion did produce an immediate noticeable change upon the program, the long term costs of the program have not been significantly altered through the conversion to a new procedural terminology.

References

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Questions and Answers

Question: Sir, I am not an economist, and I don't pretend to understand all of these things. But I am involved in a small way with Current Procedure Terminology on a national level and am a practicing physician in New York State. I'm at a total loss to understand how you define "charges." Before you answer, I'd like to tell you that in New York State, Medicaid reimbursement for the specialty that I practice is on the order of 25 percent of the usual and customary allowable fee. The Medicaid people are not interested in what the fee is at all. We tell them how many units the procedure is and they pay us X dollars a unit and that's it. So they don't know what our charges are. Now by charges, do you mean the usual charge?

Alan Newman: It is the physician's usual charge for that service. You can distinguish that from usual and customary by the fact that it's whatever the physician decides he or she is going to bill the system on that particular day. It can be anything the physician wants. Now, Virginia does not pay on the basis of usual and customary charges. Virginia has set fees which have. . .changed since the beginning of the program. Even with the conversion, the new codes have been priced according to relative values that were established for the system in 1972. Does that answer your question? It's whatever is billed.

Question: A few months ago, I had occasion to look at a preliminary copy of your report fairly carefully. In this draft report you showed a 6.2 percent increase in average fees when using the new weights on the frequencies in surgery, pathology, radiology, and medicine. When calculating the percentage increase in fees using the old weights from the 1974–75 period (when surgery was much more heavily weighted) and the new percentage increases in the amounts paid, there is a 10.6 percent increase in the average fee. That is really a substantial difference. The issue becomes an index problem involving which weights you use. Looking at the new weights that you did use you can't really assume that the weights are always going to change as drastically as you have shown. In fact, I have heard, and perhaps you can verify this, that one of the reasons that surgery decreased as much as it did was because of a recent regulation in the Virginia Medicaid program that the hospital stay was limited to just a few days for each operation. This may have resulted in some people not having surgery and postponing it to another year. Or these individuals may have gone to public hospitals. I think you have to be really careful when you look at the overall average payment increase.

Alan Newman: Just one other point. There are a number of ways of looking at expenses. I quite agree with you about why surgery dropped off as drastically as it did in the initial 6-month period. Part of the reason, I'm sure, is because, particularly in surgery, there were a number of codes which did not have fee limits pre-assigned. Those codes were left pending and as a consequence, some proportions may have been left out of the transition period. You do find in the next 6-month period that the rate of surgical procedures does rebound somewhat, but still not to the original level. Another way of looking at payments is simply to look at some of the total payments by the system for physician services on a time-series basis. One can see whether trends that had been established prior to conversion are continued following the conversion. We found that a short period after the inversion, the moving average of total dollars dispensed goes about three or four percent above the projection line. The latest figures I've looked at show that it's now slightly below the projection line. It's a very steady, consistent trend that we find prior to conversion. If you're ever going to use time series data for extrapolation, it seems to be a nice series to do it on, because it just seems to keep going up by a step each month. It appears to be following very nearly the same trend at the present time. At least it did not take off at a different angle, which is what you might have expected.

Question: What about the number of claims submitted. Did anything change in the pattern?

Alan Newman: The number of claims processed is about the same as we had predicted it would be on the basis of preconversion trend. Yes, it went up simply because the claims were not filled out correctly according to the new scheme. Consequently, there was an artifically high volume of claims getting processed. If you look at the number of approvable or payable claims, the hump is less pronounced, but there is still some hump.

Comment: When one looks at the Virginia study and other studies that have been done, something needs to be pointed out. There needs to be an analysis of procedural terminology changeover. It was described how within types of service there were changes in use. The question is, are those changes within a type of service causally related to the terminology, or are they just reflecting the differences in kinds of medical care that were rendered in the period? I think when most people look at the first table and the 1.9 percent, it is easy to make the assumption that the changes were not unbalanced significantly. Looking above the line across types of service, I think one saw something more significant or interesting or spectacular, depending on which number you want to look at.

Question: Suppose there was a medical procedure that might normally be charged 10 dollars, but now because of a more complex procedure terminology this procedure is split into a six dollar and five dollar fee. The average cost of this procedure is lower but the cost for the patient has gone up. The question is how can we adjust to that fact?

Alan Newman: One way is to examine the issue on a beneficiary basis rather than a cost per procedure basis. I don't think your example occurs very often.

Comment: I am one of the associate editors of CPT for the American Medical Association. I want to point out that we're talking about the second most recent edition of CPT. CPT 3 was published in 1973; CPT 4 was released in February 1977. It contains 6,140 codes, and we have had the first update to it. We're hoping to have an annual update. This is the first one in a year. We only changed about 37 things. Early misclassification can be remedied by using appropriate coding schema. Certainly CPT 4 is not the end of the world; procedural terminology changes over time, and at least for your time series studies, you're going to have to adjust to that. I would imagine that in your next analysis for your radiology section, you're going to show a very large increase as you account for the changes in practice.

Question: When you look at physicians in southern Virginia or rural Virginia versus northern Virginia. . .is there any difference in how they bill their patients? For example, do northern Virginia physicians fragment their billing more than other Virginia physicians?

Alan Newman: We didn't do that, I don't know.

Comment: I'm from Blue Shield in Pennsylvania, and we did a procedural terminology conversion, I believe, in 1972. At that time, we had a couple of different procedure terminologies working concurrently for different lines of business in Pennsylvania. We happened to be the carrier for Medicare. We also do some of the Medicaid work, and we have our own private business, of course. It was very awkward trying to figure out what was going on and keeping track of it well when we were using different sets of terminology. That was our principal motivation to go to some kind of uniform terminology. We developed our own terminology system which was based principally upon CPT as it existed at that time. We've had a few minor changes since then, but what we have now is essentially still based on CPT. We made the change to our own private terminology in our private line of business very easily, because it was our own decision. We did get some resistance from Social Security Administration, who remembered the California experience. They believed that in California some fragmentation was happening. In the final analysis the change caused some increases in costs. The Social Security Administration finally said, if you want to make this change go ahead, but it is incumbent upon you to prove to us that there is no inflationary impact. So we did a study which we funded ourselves at the time. The answers were to be delivered to the Social Security Administration. That study was done about 1973. It was aimed at exactly the same kind of issues that your study was supposed to aim at. The results were very similar. We found that, indeed, there was no inflationary impact, and that, to a certain extent, there was, in fact, what you might call a better controlling effect. We found that the costs probably went down a very little bit, but so little that it was hardly significant. Now, I'd like to put a little perspective on exactly what's happening in Pennsylvania. I think there's a great misunderstanding as to exactly what happens when you get a procedural terminology change. You can go from a system of say, 2,000 or 3,000 items of terminology to a system where you have five or six thousand. The misconception arises that most people feel prices are surely going to go up because what we are doing is decomposing a single procedure into two or more components. It is true that now the doctor can charge for both these components. For instance, you have an EKG which is a tracing, and there is also an interpretation. In some cases that has been reported as one single entity. When you break it up, it's usually better to have a separate procedure for each of these plus another procedure that says both. But the more common kind of thing that's happening is that you are really improving your taxonomy. For instance, take tonsillectomies. I'm just making hypothetical examples. But you might have a tonsillectomy and that's it. In a more refined version, you might have a tonsillectomy for a child and a tonsillectomy for an adult. That's two separate things. The point is that what you've really done is simply refined what you call a tonsillectomy. What the doctor reports is just one service. Most of what's involved in a procedural terminology is a refining process.

Physician Involvement in Hospital Decision-Making

by Michael Redisch

The focus of government health care policy over the past two decades has subtly changed from earlier commitments to provide health care to all who are in need to ways to constrain future increases in health care costs. And the major policy battleground is the hospital sector, where the most serious health care cost increases occur.

A number of as yet untested proposals are being offered to combat inflation in the hospital without unduly limiting access to or quality of care. These suggestions include certificate-of-need laws, hospital rate review, various forms of prospective reimbursement, remission to direct wage and price controls of the Economic Stabilization era, or market strategies revolving around the growth of Health Maintenance Organizations.

However, too often in attempts to conceptualize the process by which the hospital sector will react to one or more of these control mechanisms, a central and overriding feature of the U.S. hospital system is omitted. The unique relationship between the hospital and the physician in the production of health care is ignored by many of those attempting to understand or predict the reaction of hospitals to specific government policy. Instead, the hospital is typically viewed as an institution differing from ordinary firms only to the extent that a major portion of hospital care is provided in a not-for-profit setting.

An explanation for the lack of a strong physician figure in most models of hospital behavior can probably be traced to the payment mechanism for health care in the U.S. The hospitalized patient is faced with two separate billings; one for "hospital" services and one for "personal physician" services. This dual billing system has led to a false dichotomy whereby the hospital and the physician are often erroneously viewed as independent entities selling services in functionally segmented health markets. Yet from the patient's point of view, "health care" in a hospital setting should be viewed as a single product jointly produced by the combined actions of hospitals and physicians.

In this paper we attempt to delineate more specifically the roles that the physician may play in strategies aimed at controlling cost increases in hospitals. Any effective mechanism for containing the ongoing rapid rises in hospital costs must explicitly take into account the involvement of physicians in hospital decision making. Few hospital administrators like to admit how limited their control is over the operation of their hospitals. Administrators would like to believe that by their efforts alone, order and direction are distilled from anarchy. Yet it is the physician, operating as a separate entity outside the control of the Board of Trustees or the administrator, who directs most of the major resource decisions in the hospital. The physician recommends admission, takes responsibility for ordering diagnostic procedures and therapeutic measures, and determines when the patient is fit to leave the hospital. In addition, the physician lobbies with hopes of committing the administrator and trustees to invest in additional beds, in personnel to help the physician provide more and better patient care, and in new and expensive technology.

A model of complete physician control, while admittedly an abstraction of reality, is close enough to still be considered a useful tool for analyzing various policy formulations. (See Pauly and Redisch (1973) for a rigorous statement of such a model.) The two lines of internal authority in the hospital can lead to inevitable conflict between administrators and physicians, particularly under a regime of unconstrained cost reimbursement. In fact, the administrator typically finds his own job security most closely tied to his ability to satisfy the demands of the medical staff. Viewed in this extreme light, the administrator's role is simply to provide labor, supplies, and facilities to independent physicians. It is the physician who directs the actual provision of care in the hospital.

Trustees are also organizationally structured to exert external control over physician behavior. In a nonprofit hospital there are no stockholders or owners of equity capital. The Board of Trustees presumably represents the public interest and bears some form of legal and moral responsibility for all activities, professional and otherwise, which occur within the institution. However, while each member of the typical Board is a competent individual in his own field, he or she is unprepared for participation in the types of issues and decisions involved in the management of the hospital. Ordinarily the trustees have a limited knowledge of the medical profession and their knowledge of the hospital is usually restricted to personal contacts as a patient or as a relative of a patient.

Physician dominance of resource decisions within the hospital can be tied to the 10 to 20 percent annual increases in per diem costs since 1965. These cost increases are critically related to changes in the quantities, qualities, and sophistication of the services which are lumped together under the output designation of a patient

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day. The origins of this rise in the volume of labor and nonlabor inputs used per patient day can be traced in part to the ability of the physician over time to reduce his own input or operating costs by transference of functions and costs to the hospital.

If this transference were done in an economically and socially efficient manner, then society could capture the potential gain generated from substitution of low-cost hospital inputs for high-cost physician time. While hospital costs would register increases, these would be more than compensated for by decreases in aggregate physician bills to patients. However, this does not appear to have occurred.

There are three forces at work that tend to mutually reinforce the physician's incentive to use hospital services in an economically inefficient manner: (1) The separation of physician and hospital bills for jointly produced health care; (2) the proration of basic hospital service costs over all patients; and (3) the pervasiveness of insurance for hospital services. These three forces make the apparent cost to the physician of additional hospital services very small relative to the true social costs of the inputs used to produce that service. This creates major incentives for the physician to oversubstitute hospital inputs for his own labor and to order the production of only marginally beneficial health and hotel services in the hospital.

While the number of inputs used to produce basic hospital room and board services have increased over time, the really dramatic increases in hospital resource intensity seem to be related in large part to increases in the availability and utilization levels of a set of diagnostic and therapeutic medical services provided in a hospital setting under the direction and control of physicians. This can be seen quite clearly in Table I. Over a period of time (1968 through 1971) the number of operating room visits per adjusted patient day actually declined slightly in these sample hospitals. But we can see an explosive growth in the utilization level *per adjusted patient day* of seven medical services (pathology tests, nuclear medicine procedures, pharmacy line items, inpatient and outpatient laboratory tests, inpatient and outpatient radiology procedures, therapeutic radiology procedures, and blood bank units). There is no break in the general pattern when hospitals are classified into separate groups according to the number of beds. In a separate paper by the author (Redisch, 1974), hedonic cost indices are estimated which suggest that the growth of these seven medical services account for more than one-third of the increase in cost per adjusted patient day in the sample hospitals. Since approximately one half of the per diem cost rise is related to rises in unit costs of basic inputs, these estimates imply that two-thirds of the increase in real inputs per adjusted patient day in the sample hospitals were related to increases in the per diem use of these seven medical services.

This ancillary service growth that has contributed such a large share to the rise in per diem hospital costs is under the direct control of the physician. This documentation of the pervasive influence of physicians in determining resource allocation within the hospital implies that control measures to hold down the rate of inflation of hospital costs, if aimed solely at the hospital, will be disappointing. Certificate-of-need, rate review, or alternative forms of prospective reimbursement all *do* provide the administrator with an added rationale for confronting and standing up to the physician staff. Yet the benefits to the administrator of siding with the staff are usually so high that true confrontations are exceedingly unusual.

Most hospital administrators see themselves in competition with other hospitals for physicians, not for patients, since it is only through a physician that an individual may be admitted to a hospital. As long as there are other hospitals that will admit him to practice, a physician is not totally dependent on a particular hospital

Table 1[1]
Growth in Selected Hospital Services

	1968	1969	1970	1971	% Change 1968–1971
Operating cost $	55.51	60.89	69.60	78.75	41.8%
Operating room visits	.05456	.05071	.05223	.05373	−1.5%
Pathology tests	.06327	.11652	.11504	.10914	72.5%
Nuclear medicine procedures	.00252	.00705	.00690	.00965	282.9%
Pharmacy line items	.35610	.79150	.91918	1.0449	193.4%
In & outpatient lab tests	2.2046	2.2964	2.5393	2.8588	29.7%
In & outpatient radiology proc.	.31753	.31604	.33519	.36378	14.6%
Therapeutic radiology proc.	.00685	.01394	.01577	.01894	176.5%
Blood bank units	.03759	.05881	.05333	.06333	68.5%

[1] All figures are reported in whole units normalized on adjusted patient days. Thus in 1968 operating cost per adjusted patient day in the sample was $55.51 and the average number of pathology tests per adjusted patient day was .06327.

The data were provided by the Health Services Research Center (the Center) of Northwestern University and the American Hospital Association (AHA). It was obtained by the Center from the Hospital Administrative Services (HAS) Division of the AHA. Data is submitted to HAS on a monthly basis by several thousand voluntarily participating hospitals. These hospitals may then compare their performance in providing services with similarly situated institutions. No payment for services is based on the completed HAS forms, and the data is not audited. The original sample consisted of almost 400 hospitals. After eliminating those hospitals that did not appear in one or more years, we were left with a final sample of 285 hospitals.

for his livelihood. But a hospital that cannot retain a satisfied medical staff will soon find its occupancy rate falling, its per diem costs rising, and its ability to function as a health care institution seriously impaired. Furthermore, if cost guidelines are given to a hospital on a per diem basis; many administrators may find themselves in the seemingly paradoxical situation of sanctioning certain marginal equipment and personnel decisions or capital projects to attract or keep physician staff so that the occupancy rate will be high enough to move the hospital within the per diem cost constraints.

It is not surprising that administrators will put off as long as possible the inclusion of medical staff into any negative budgetary decisions that must be made. Cost containment is initially considered an administrative issue, not a medical one. If hospital budgetary controls are made so tight that they cannot be met by simply eliminating any administrative slack in the hospital, then affiliated physicians will have to become more directly involved in the hospital's budgetary process. However, even when the administrator is forced to confront his medical staff on cost issues, he is at a disadvantage. Physicians can argue persuasively and with a unique degree of authority about medical need and quality of care. It is difficult for the hospital administrator to pick and choose among these arguments and make resource decisions that hurt one physician group but not another. Even when these types of negative decisions are chosen, they are most likely to be based on the degree of power of the various physician specialty groups within the hospital, rather than on criteria based on some nebulous concept of social efficiency norms.

A more effective control mechanism might make an impact on the physician directly, rather than through the administrator. Yet the costs of policing physicians through direct regulation on a case by case basis can be excessive. Medical cases are highly differentiated goods. No two patients are ever exactly the same, even if they exhibit the same general set of symptoms. If the decision to hospitalize were based solely on medical reasoning, the physician would be hospitalizing a disease rather than a person with a disease.

Direct government intervention through the regulatory or rate review process also does not appear to be the panacea that will bring hospital cost inflation in line with price rises in the rest of the economy. There is a real danger that health care regulation will be an institution proposed and supported by members of the industry as a mechanism for supplanting whatever competitive elements remain with a legal, enforceable cartel. This view would allow for state hospital associations to petition their legislatures to put them under the protective umbrella of a state mandated prospective reimbursement system that is meant to *guarantee* an "adequate" cash flow to each hospital. This view would also encompass the use of Comprehensive Health Planning by local hospital groups as a vehicle for keeping Health Maintenance Organizations (HMOs) and proprietary institutions from encroaching on their territory.

Even if direct hospital regulation turns out to be a moderate success, its role will be enhanced even more by some basic structural changes in the way physicians are educated and reimbursed. Today the typical physician, acting in the interests of himself and his immediate patients, puts little weight on the larger issues of economic efficiency and social benefit. This attitude has been reinforced by the strong technological imperative instilled in physicians during their medical training programs (and is tacitly encouraged by the present cost-based system for financing hospital care).

The professional training of physicians has traditionally not emphasized the concept of the physician as a manager of health care resources confronted with complex issues of cost and efficiency. Instead, the physician emerges from his training period with a perception of the hospital as a rent-free workshop, a place where he feels justified in pressing administrators and trustees to add those services that allow for full, modern treatment of patients while simultaneously enhancing the physician's income and prestige.

This phenomenon is, of course, closely linked to the explosive growth in the opportunities for applying new and high cost technology in health care. The growth of technological applications in health care has interacted with the current orientation of medical training programs in a feedback mechanism that is leading the health care system down an explosive path. The new high cost, hospital technology necessitates specialization and fosters a narrow professionalism among new physicians. That is, for reasons relating to income, prestige, and the way that modern medicine is practiced, new physicians are drawn away from a primary care, office-based setting and toward the practice of specialized medicine within an urban, institutionalized setting. This trend toward medical specialization in turn creates ever greater physician demands on hospitals to adopt still more technology, completing the cycle and starting it anew.

The greatest potential in using the physician to contain hospital costs may lie in the movement, whenever possible, away from fee-for-service as the method of reimbursing physicians and away from a system in which individual physicians control hospital inputs without bearing any responsibility for them. This type of movement, if feasible at all, would probably have to take place in piecemeal, incremental fashion. Capitation or salaried service may marginally increase in popularity, but it seems clear that, even with a major restructuring of the health care system through national health financing legislation, these two methods of reimbursing physicians will for some time appear at best as options to physicians who desire alternatives to fee-for-service. To be politically feasible any new system must meet with at least grudging acceptance by physicians.

Adoption of a "European style" health care system, with hospitals primarily the domain of salaried specialists, and with general practitioners operating independently in office-based settings, would seem to be a step in this direction. Many physicians are already practicing in hospitals on a straight salary. These would include interns and residents (who comprise more than 20% of active physicians in many states), full time salaried chiefs of staff, and other physicians serving educational functions. Other physicians might be induced to practice as salaried hospital physicians if the salary were high enough. (While many physicians are ideologically opposed to anything but fee-for-service reimbursement, others are concerned not about ideology but about income and hours of work.)

However, adopting a European style system for the United States would present many problems. There would have to be a determination of the level of physician salaries and of payment responsibilities. State laws against the corporate practice of medicine would have to be redesigned (they are currently being rewritten in many states to allow for the functioning of HMOs). A way would have to be found to gradually allow new staff privileges only to salaried specialists. And more importantly, while this system removes many of the perverse incentives individual physicians face with respect to using hospital resources, it does nothing by itself to provide incentives to the hospital to contain costs.

The major physician-related impetus to cost containment in hospitals may come from the growth and encouragement of non-foundation type HMOs. It has been suggested that these HMOs keep hospital costs in check not by the organization as an entity going at risk to provide medical care, but from the actions of staff physicians who are removed from fee-for-service reimbursement, who practice in multispecialty groups, and who do not operate with complete autonomy with respect to resource control.

In the end it must be remembered that the search for a single panacea to contain hospital and other health care costs is likely to be a futile one. There are major forces at work in the health care arena. They are related to the interaction of physician incentives, patient passivity (induced in part by high levels of insurance), new technology, and cost-related hospital reimbursement. These forces are not unique to the U.S. health care system. Costs of hospital care and other forms of health care can be observed to be rising rapidly in many societies operating under a wide range of regulatory activity and financing arrangements. The lesson to be learned is that there does not appear to be a single, simple solution to the health care cost crisis. Instead, the problem is one that will have to be solved (or at least partially alleviated) through a number of small, discrete steps. Using the physician as a lever to help contain hospital costs in one of those steps.

References

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The Effect of Medical Staff Characteristics on Hospital Costs

by Mark Pauly

Purpose of Project

The purpose of this project was to examine the feasibility and usefulness of combining data on characteristics of a hospital's medical staff with data on its costs. The fundamental premise was that physicians have important effects on differences in the use of resources within hospitals. Some of those differences might reasonably be attributed to identifiable physician characteristics. It seems reasonable to suppose that a hospital's costs, and some other yardsticks of its expensiveness as well, reflect the resources used to provide hospital care. If physicians with different characteristics systematically combine inputs to produce outputs in different ways, hospital cost might be associated with those physician characteristics.

Feasibility of Data Collection

The final data base used in the analysis of this project consists of four major sets of information:

1. 79,615 discharge abstracts containing primary and secondary diagnoses, and other important clinical and demographic characteristics for each inpatient discharged during 3 months from 50 California community hospitals, for the period April-July 1975.
2. The characteristics, expenses, revenues, etc. of the 50 community hospitals in which the 79,615 patients were treated.
3. The characteristics of 2,861 physicians who admitted, attended and/or treated 70,013 of the 79,615 patients in the above 50 hospitals.
4. Hospital control, facilities, and annual aggregate cost and output data for the 50 hospitals obtained from American Hospital Association Guide Issue data.

This data set was assembled by combining patient discharge abstracts from California Health Data Corporations' (CHDC) MR II system with cost data from the Hospital Administrative Services Program of the American Hospital Association. Data on physician characteristics from the American Medical Association's *Directory* was combined with patient records by CHDC. Physicians who accounted for an average of two or fewer patients per month were not included. This deletion cut the required number of physicians by nearly half, but only reduced the number of cases for which physician characteristics were present by 8 percent. Some of the initial sample of 60 hospitals were dropped because they provided incomplete data on physician names or because it was impossible to match many of their physicians. The characteristics of the sample and a comparison with other California and U.S. hospitals are shown on Table 1.

It was therefore possible for CHDC to link physician and patient data for almost all patient records in almost all hospitals. The final data set contains no identification of individual hospitals, patients, or physicians. All data were edited and identifying markers removed.

Table 1
Characteristics of Study Hospitals

	Study Hospitals	California Hospitals	U.S. Hospitals
Average Number of Beds	181	149	158
Average Length of Stay	6.3	6.7	7.8
Occupancy Rate	67%	68%	76%
Births/Admissions	9.9%	9.5%	9.0%
Personnel/Beds	2.45	2.57	2.46
Average Wage Rates	$4.14	$4.48	$3.89
Total Expenses/Bed	$41,762	$44,743	$35,223
Total Expenses/ Admission	$1,072	$1,209	$992
Total Expenses/ Inpatient Day	$171	$181	$128
Total Salaries/ Admission	$520	$623	$541
Total Salaries/Inpatient Day	$83.0	$93.4	$69.6
Salaries/Total Expenses	48.5%	51.6%	54.5%
Number of Hospitals	50	547	5,875

Source for this and following tables: American Hospital Association, *Guide to the Health Care Field,* 1975 edition. With one exception, none of these hospitals is a major unit in the teaching program of a medical school, as indicated by the American Medical Association, *Guide to Approved Internships and Residencies*, 1974 edition.

Conceptual Framework[1]

The conceptual framework used to analyze these data was based on the notion that the incurred cost in treating any patient is based on the patient's characteristics, the

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[1] The analysis in this and subsequent sections is discussed in more detail in Mark Pauly, "The Effect of Medical Staff Characteristics on Hospital Costs," *Journal of Human Resources*, Vol. XIII Supplement, University of Wisconsin Press, 1978.

hallmarks of the physicians who treat the patient and the general characteristics of the hospital and its medical staff. Individual physician characteristics are thought to measure human capital endowments, and so may be expected to affect the efficiency of the hospital production process. The most important observable human capital variables in the data set are the physician's age and his specialty, although some geographic aspects of training are significant also. An important general characteristic of the medical staff is the concentration of output among staff physicians, a variable which, based on the well-known "size principle", should reflect both the price incentives to individual physicians and the problems of coordinating physician decisions. A behavioral model of the hospital in which the size principle operates but in which medical staff and administration share power was developed. Such a model suggested that, if physicians control the hospital, costs and output concentration will be *inversely* related. However, if the administration had some power and if it desires costs to be lower than do physicians, output concentration could be *directly* related to cost.

The behavioral-cost-function model was applied to two sets of data. One set consists of individual patients and physician characteristics data for patients with 22 common diagnoses. Total *charges* (as well as length of stay) are used as measures of costliness. These results will not be reported here.

The second set of data used total hospital *cost* as the measure of costliness. An index of non-obstetrical casemix was developed by using relative charges as weights. Its usefulness in a hospital cost function was validated with another set of data. This index, along with an indicator of the proportion of obstetrical discharges, was used to measure diagnostic mix.

Regression analysis indicated that both casemix *and* medical staff characteristics affect hospital costs. Both sets of variables were significant. The set of casemix variables reduced unexplained variance by 28 percent, but the set of medical staff characteristics variables reduced unexplained variance by 38 percent.

The results of the regression analysis are shown in Table 2. The price of professional services (P2) is used to deflate total costs. Other variables are defined in Table 3. Hospital total costs were found to be significantly related to input prices, to the volume of hospital admissions (adjusted for outpatient visits), to casemix, and to two kinds of medical staff characteristics. One type of medical staff characteristic is the concentration of output among staff physicians. This was measured in two ways—by the fraction of output attributed to physicians who treat on the average two or fewer cases per month, and by an index of the concentration of output among other physicians. Both variables suggest strongly that costs will be higher the less concentrated is output among physicians. Indeed, apparent decreasing returns to scale in hospitals are changed to approximately constant returns when these variables are added. The implication is clear: diffusing a given number of patients among more physicians raises hospital costs. Adding the physician variables, especially the output concentration variables, substantially increases measured returns to scale.

Table 2
Cost Function Regressions: Alternative Prices and Deflators Means, Standard Deviations and Regression Coefficients
("t" statistics in parenthesis)

	Input Prices = Dept. Expenses per Manhour		
Variables	Mean Value	S.D.	Regression Coefficients Using P_2 as Deflator
Adjusted Admissions	1,977	1,486	.926 (9.35)
Nursing Services Price (P_1)	6.85	4.50	.744 (3.96)
Profess. Services Price (P_2)	14.83	4.51	
General Services Price (P_3)	9.50	3.06	.165 (1.64)
Administr. Services Price (P_4)	15.14	4.31	−.172 (−1.51)
Location in Large Urban Area	0.62	0.49	.128 (2.28)
Casemix Index	0.99	0.07	1.647 (2.86)
Proportion OB	0.11	0.07	−.058 (−1.75)
Output Concentration Index	0.07	0.10	−.144 (−1.67)
Proportion Missing	0.12	0.07	.107 (2.59)
Prop. Adm. with Prim. Attending (P.A.) Board Certified	0.65	0.14	−.049 (−.411)
Proportion P.A. Pediatrician	0.03	0.06	.037 (1.68)
Proportion P.A. Internal Med., other Med.	0.14	0.08	.058 (1.05)
Proportion P.A. General Surgeon	0.13	0.06	−.118 (−2.56)
Proportion P.A. OTO	0.05	0.06	−.009 (−.730)
Proportion P.A. OBG	0.15	0.11	−.008 (−.926)
Proportion P.A. other surg. spec.	0.15	0.09	*
Proportion P.A. other specialty	0.04	0.09	−.047 (−2.01)
Constant			5.029 (5.93)
R^2			.982
(Significance)			(.00)
$\bar{R}^2$			.973

* F level below critical value

Table 3
Definitions of Variables Used In Cost Function Regressions

	Variable Name	Definition
1.	Adjusted Admissions	Defined in text.
2.	Nursing Services Price	Nursing division expense per man-hour or wages and salaries per man-hour.
3.	Professional Services Price	Other professional services expense per man-hour or wages and salaries per man-hour.
4.	General Services Price	General services division expense per man-hour or wages and salaries per man-hour.
5.	Admin. Services Price	Fiscal and administrative services expense per man-hour or wages and salaries per man-hour.
6.	Location in large urban area	Dummy variable: 1 if hospital in L.A. or S.F.-Oakland SMSA, O otherwise.
7.	Casemix index	Computed casemix index (described in text).
8.	Proportion OB	Proportion of admissions with diagnosis of uncomplicated delivery.
9.	Output concentration index	Described in text.
10.	Proportion missing	Proportion of admissions for which primary attending physician specialty is not recorded.
11.	Prop. Adm. with Prim. Attending (P.A.) Board Certified	Proportion of admissions for which primary attending physician is a board certified specialist.
12.	Proportion P.A. Pediatrician	Proportion of admissions for which primary attending physician is a pediatrician.
13.	Proportion P.A. Internal Med., Other Med.	Proportion of admissions for which primary attending physician specializes in internal medicine or other medical specialty.
14.	Proportion P.A. General Surgeon	Proportion of admissions for which the primary attending physician is a general surgeon.
15.	Proportion P.A. OTO	Proportion of admissions for which the primary attending physician is an otorhinolaryngologist.
16.	Proportion P.A. OBG	Proportion of admissions for which the primary attending physician is an obstetrician-gynecologist.
17.	Proportion P.A. other Surg. Spec.	Proportion of admissions for which the primary attending physician is another kind of surgical specialist.
18.	Proportion P.A. all other specialities	Proportion of admissions for which the primary attending physician has a specialty which is not medical or surgical.
19.	Control	Dummy variable: 1 if proprietary hospital, O otherwise.
20.	UR 1	Dummy variable: 1 if hospital not located in SMSA.
21.	Proportion S.T.	Proportion of admissions surgically treated.
22.	Proportion over 65	Proportion of admissions of persons 65 or older.
23.	Physician age.	Weighted mean age of primary attending physicians, weighted by number of admissions for which the physician is primary attending.
24.	LOS	Mean length of stay (days).
25.	Int.-res. program	Dummy variable: 1 if hospital employs some interns or residents.
26.	Less than seven cases missing	Proportion of discharges for which primary attending physician had fewer than seven admissions to hospital during 3 months.
27.	Residual missing	Variable 10–Variable 26.
28.	Prop. Surgeon not P.A.	Proportion of surgically treated cases in which the primary surgeon and primary attending physician are different.

The second kind of characteristic is staff specialty. *Holding measured casemix constant,* the specialty of attending physicians significantly affected hospital cost. Costs were significantly higher when there are larger proportions of pediatricians on a hospital's staff, and they are lower when there are larger proportions of general surgeons, and specialists who are neither surgical nor medical. Otorhinolaryngologists and other surgical specialists did not affect cost; the coefficients for internists and obstetricians were reasonably large but are not estimated precisely.[2]

In order to understand the significant coefficient for general surgeons, we added the proportion of cases surgically treated, another measure of case complexity, to the regression. This variable was not significant and reduced the coefficient for general surgeons as attending only slightly, although the standard error does increase. These results suggest that there *is* some direct influence of general surgeon proportion, that it does not just act as a proxy for casemix or the marginal costs of surgical treatment.

Why should hospitals to which relatively more general surgeons admit patients behave differently from others? One possibility is that surgeons are likely to be more hospital-oriented than internists, pediatricians, or general practitioners. Because hospital care is more important in their practices, hospital-oriented physicians might be expected to be more careful about their use of the hospital, and more concerned about excessive hospital costs. Because they use the hospital more frequently, they will be better monitors of hospital activity. If general surgeons can affect hospital behavior, then they might be expected to have the hospital run in a lower cost manner, even if, within any hospital, surgeons might treat a given diagnosis in a more costly way.

The conclusion is that *both* casemix and measured medical staff characteristics are important. In this set of relatively homogenous hospitals in a single state, casemix is of some importance, but not overwhelmingly so. This is in some contrast to previous findings. Of perhaps more interest is the significance of the measured medical staff variables. In part these variables act as a proxy for casemix. For example, obstetricians are highly correlated with the proportion of total discharges that are normal deliveries. More importantly, measures of medical staff characteristics also have an influence of their own, *even after* adjusting for measures of casemix. This influence reflects both the specialty composition of the medical staff and the division of output among staff members.

When an alternative measure of casemix based on fourteen diagnostic groups was used, the results were approximately the same, as shown in Table 4. Indeed, using this second measure, the estimated negative effect on costs of output concentration among physicians was even stronger. Using the "basic set" of variables in the first column of Table 2, we tested the effects of adding other possible independent variables. As shown in Table 5, control of hospital, fraction of patients over 65, and occupancy rate were not significant. The last result is of some interest, since it suggests that empty beds did not lead to increased costs for individual hospitals, once output, medical staff characteristics, and input prices are taken into account. Physician age did turn out to be significant, but its sign is *positive*. A dummy for whether the hospital has interns and residents had a significant and positive sign. Even for these hospitals, the existence of minor teaching programs raised hospital cost.

Table 4
Cost Function Regression Results Using Diagnostic Categories as Measures of Casemix
(t statistics in parentheses)

Variables	Using set of variables which maximizes $\bar{R}_2$	Using all variables	Mean proportion of discharges (std. deviation)
Adjusted Admissions	700 (8.94)	.728 (6.28)	
Nursing Services Price (P_1)	.779 (7.41)	.714 (3.96)	
Professional Services Price (P_2)	Deflator	Deflator	
General Services Price (P_3)	.157 (2.09)	.245 (2.00)	
Administr. Services Price (P_4)		−.564 (−.36)	
Location in large urban area	.128 (2.78)	.186 (2.36)	
Output Concentration index	−.224 (−3.35)	−.240 (−2.50)	
Proportion Missing	.075 (2.47)	.079 (1.82)	
Prop. Adm. with Prim. Attending (PA) Board Certified		−.034 (−.29)	
Proportion P.A. Pediatrician	.030 (1.77)	.033 (1.37)	
Proportion P.A. internal med., other med.	−.057 (-1.48)	−.009 (−.12)	
Proportion P.A. General Surgeon	−.088 (−2.41)	−.080 (−1.67)	
Proportion P.A. OTO		−.051 (−.97)	
Proportion P.A. OBG		−.019 (−.66)	
Proportion P.A. Other Surg. spec.		−.092	

(continued)

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[2] It was suggested in the discussion following this paper that the effect of pediatricians could arise from an association of a large proportion of patients with pediatricians as attending physicians and the presence of underused (and therefore expensive) pediatric units in children's hospitals or other hospitals. Some evidence for this explanation is that when the hospital with the largest fraction of patients aged 15 or less was dropped from the regression, the coefficient on proportion of patients attended by pediatricians ceases to be significant at the 0.1 level or better.

Table 4 (Cont'd)

Variables	Using set of variables which maximizes $\bar{R}_2$	Using all variables	Mean proportion of discharges (std. deviation)
Diseases of digestive system	−.249 (−2.00)	−.293 (−1.41)	.131 (.051)
Diseases of genitourinary system	−.380 (−5.34)	−.324 (−3.07)	.111 (.041)
Injuries/adverse effects of medicines	−.192 (−2.80)	−.162 (−1.52)	.103 (.034)
Diseases of circulatory system		−.093 (−.58)	.128 (.037)
Neoplasms	.179 (3.36)	.177 (2.07)	.072 (.032)
Diseases of skin or musculoskeletal system		.062 (.69)	.076 (.038)
Diseases of nervous system or sense organs		.041 (.63)	.044 (.026)
Mental disorders		Does not enter	.030 (.056)
Symptoms	.117 (1.82)	.147 (1.64)	.044 (.018)
Diseases of endocrine, system, metabolism, or blood	.195 (2.87)	.082 (.64)	.025 (.010)
Infective or parasitic disease		−.026 (−.35)	.012 (.007)
No sickness or aftercare	−.075 (−3.20)	−.064 (−1.94)	.013 (.012)
Obstetrics		−.004 (−.13)	.117 (.075)
Constant	5.75 (9.76)	4.95 (3.35)	
R^2	.98980 (.00)	.99086 (.00)	

Finally, when length of stay was added, it had a positive and significant coefficient. The coefficient on LOS is very close to unity, indicating that, if casemix is held constant, the long run marginal cost of an extra day of stay is very close to its average cost. With days of stay held constant, output concentration is still important, although PROPMIS[3] no longer is. But significantly increasing returns to scale are now displayed, while the change in the coefficient is not itself significant. Both casemix variables now cease to be significant, as does the proportion of cases treated by general surgeons.

Total costs were also disaggregated into costs for four hospital departments: nursing, professional (laboratories), general (housekeeping), and administrative. The regression analyses of these costs, shown in Table 6, can be viewed either as cost functions for the intermediate outputs or as input demand functions.

Medical staff characteristics have the strongest effect, as expected, on the nursing department. The output concentration index and physician specialties are most important here. Input prices, of course, are also important. Professional services department costs are affected very strongly by casemix, but not by medical staff characteristics. Except for the fraction of output for which the attending physician admits two or fewer cases per month, medical staff characteristics do not have a strong or consistent effect on costs in other departments.

Policy Implications

The significance of these staff variables has implications for hospital incentive or prospective reimbursement schemes. Other things equal, those hospitals which have "low-cost" physicians on their staffs will lose if payments do not take account of staff composition. The precise way in which hospital incentive payments might affect medical staff behavior (if it is affected at all) is not known. The importance of these staff effects suggests that it would be desirable to investigate the medical staff's incentives directly rather than when diffused throughout the hospital's corporate structure.

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[3] For a definition, see Table 3.

Table 5
Regression Coefficients (t statistics in parentheses)

Variables	Basic Regression	Variable Added: Control	Variable Added: % Surgical	Variable Added: Age 65+	Variable Added: Physician Age	Variable Added: Mean 1.05	Variable Added: Intern-Resid.	Variable Added: Occupancy Rate
Adjusted Admissions	.926	.924	.854	.907	.982	.843	.898	.938
	(9.35)	(9.27)	(7.57)	(9.23)	(10.22)	(10.68)	(9.76)	(9.02)
Nursing services Price (P_1)	.744	.801	.799	.734	.822	.797	.677	.769
	(3.96)	(3.90)	(4.27)	(3.97)	(4.57)	(5.44)	(3.87)	(3.83)
General Services Price (P_3)	.165	.147	.153	.170	.119	.188	.165	.144
	(1.64)	(1.41)	(1.55)	(1.72)	(1.24)	(2.40)	(1.78)	(1.35)
Administr. Services Price (P_4)	−.172	−.197	−.194	−.170	−.157	−.029	−.207	−.114
	(−1.51)	(−1.65)	(−1.65)	(−1.52)	(−1.43)	(−.30)	(−1.91)	(−2.36)
Location in Large Urban Area	.128	.135	.111	.123	.086	.001	.123	.125
	(2.28)	(2.34)	(1.92)	(2.21)	(1.51)	(.02)	(2.28)	(2.17)
Casemix Index	1.647	1.607	1.471	2.223	1.740	.155	1.524	1.807
	(2.86)	(2.76)	(2.62)	(3.22)	(3.17)	(.28)	(2.83)	(2.84)
Proportion OBG	−.058	−.059	−.052	−.068	−.060	.020	−.067	−.064
	(−1.75)	(−1.78)	(−1.70)	(−2.06)	(−1.87)	(.65)	(−2.10)	(−1.76)
Output Concentration Index	−.144	−.126	−.211	−.159	−.038	−.123	−.133	−.138
	(−1.67)	(−1.39)	(−1.96)	(−1.86)	(−.40)	(−1.72)	(−1.56)	(−1.58)

(continued)

Table 5 (Cont'd)

Variables	Basic Regression	Variable Added: Control	Variable Added: % Surgical	Variable Added: Age 65+	Variable Added: Physician Age	Variable Added: Mean LOS	Variable Added: Intern-Resid.	Variable Added: Occupancy Rate
Proportion Missing	.107	.113	.116	.095	.082	.035	.098	.103
	(2.59)	(2.66)	(2.71)	(2.30)	(1.99)	(.97)	(2.51)	(2.37)
Proportion Adm. with Prim. Attending (P.A.) Board Certified	−.049	−.056	−.014	−.043	.090	.028	−.021	−.056
	(−.41)	(−.46)	(−.11)	(−.37)	(.72)	(.29)	(−.19)	(−.41)
Proportion P.A. Pediatrician	.037	.035	.033	.043	.049	.058	.026	.037
	(1.68)	(1.54)	(1.50)	(1.96)	(2.31)	(3.27)	(1.24)	(1.63)
Proportion P.A. Internal Med., other Med.	.058	.061	.049	.049	.053	−.028	.073	.050
	(1.05)	(1.10)	(.88)	(.91)	(1.00)	(−.59)	(1.40)	(.92)
Proportion P.A. General Surgeon	−.118	−.116	−.089	−.104	−.129	−.049	−.119	−.114
	(−2.56)	(−2.48)	(−1.76)	(−2.24)	(−2.90)	(−1.24)	(−2.75)	(−2.31)
Proportion P.A. OTO	−.009	−.008		−.011	.024	.039	.003	−.005
	(−.73)	(−.20)		(−.26)	(.59)	(1.17)	(.08)	(−.35)
Proportion P.A. OBG	−.008	−.007	−.003	−.015	.017	−.030	.005	−.001
	(−.93)	(−.25)	(−.10)	(−.53)	(.57)	(−1.29)	(.18)	(−.32)
Proportion P.A. other surg. spec.			.033		−.015	−.044	.022	−.007
	*	*	(.53)	*	(−.29)	(−1.00)	(.42)	(−.31)
Proportion P.A. other specialty	−.047	−.048	−.049	−.047	−.038	−.019	−.055	−.044
	(−2.01)	(−2.04)	(−2.13)	(−2.08)	(−1.68)	(−.99)	(−2.49)	(−1.70)

(continued)

Table 5 (Cont'd)

Variables	Basic Regression	Variable Added: Control	Variable Added: % Surgical	Variable Added: Age 65+	Variable Added: Physician Age	Variable Added: Mean LOS	Variable Added: Intern-Resid.	Variable Added: Occupancy Rate
Control		−.058						
		(−.72)						
Percent Surgical			−.190					
			(−1.13)					
Percent Age 65+				−.209				
				(−1.45)				
Physician Age					1.095			
					(2.48)			
Mean Length of Stay						.942		
						(4.85)		
Intern Residency Program							.263	
							(2.78)	
Occupancy Rate								−.094
								(−.55)
Constant	5.029	5.160	5.385	4.853	1.008	4.135	5.268	4.943
	(5.93)	(5.91)	(6.95)	(5.76)	(.55)	(5.87)	(6.49)	(5.43)
R^2 (Significance)	.98163	.98192	.98230	.98277	.98467	.98956	.98530	.98181
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
$\bar{R}^2$	.973	.972	.973	.974	.976	.984	.977	.971

* F level below critical value

Table 6
Departmental Cost Function Regressions/Regression Coefficients
("t" statistics in parentheses)

	Nursing & Ancillary Dept.		Professional Services Dept.		General Services Department		Administrative Services Dept.	
Variables	Own price	All Prices	Own price	All prices	Own price	All prices	Own price	All prices
Adjusted Admissions	.882	.809	1.067	1.055	1.057	1.032	1.008	.972
	(8.90)	(8.93)	(6.86)	(6.60)	(7.16)	(7.00)	(10.02)	(8.90)
Nursing Services Price (P_1)	.371	.720		.578		−.185		.336
	(1.73)	(3.53)		(1.60)		(−.55)		(1.37)
Profess. Services Price (P_2)		−.014	.234	.247		.037		−.947
		(−.10)	(1.03)	(1.05)		(.16)		(−.57)
General Services Price (P_3)		−.267		.023	.745	.668		−.062
		(−2.70)		(.13)	(4.61)	(4.15)		(−.52)
Administr. Services Price (P_4)		−.406		−.155		−.409	.352	.295
		(−3.85)		(−.82)		(−2.38)	(3.17)	(2.31)
Location in Large Urban Area	.114	.114	.108	.089	.222	.247	.175	.161
	(1.88)	(2.18)	(1.18)	(.96)	(2.50)	(2.90)	(2.84)	(2.55)
Casemix Index	1.312	1.506	3.617	3.303	1.934	2.107	1.511	1.488
	(2.30)	(2.76)	(4.00)	(3.47)	(2.18)	(2.37)	(2.48)	(2.26)
Proportion OB	−.026	−.036	−.074	−.072	−.057	−.064	−.033	−.027
	(−.78)	(−1.18)	(−1.38)	(−1.34)	(−1.17)	(−1.28)	(−1.00)	(−.73)

(continued)

Table 6 (Cont'd)
Departmental Cost Function Regressions/Regression Coefficients
("t" statistics in parentheses)

	Nursing & Ancillary Dept.		Professional Services Dept.		General Services Department		Administrative Services Dept.	
Variables	Own price	All Prices	Own price	All prices	Own price	All prices	Own price	All prices
Output Concentration Index	−.194	−.179	.124	.117	−.082	−.065	.113	.120
	(−2.12)	(−2.15)	(.86)	(.81)	(−.58)	(−.48)	(1.16)	(1.19)
Proportion Missing	.109	.133	.235	.213	.071	.120	.167	.157
	(2.39)	(3.37)	(3.51)	(3.04)	(1.10)	(1.86)	(3.66)	(3.30)
Prop. Adm. with Prim. Attending (P.A.) Board Certified	*	−.057	*	*	−.071	−.089	−.175	−.209
		(−.53)			(−.41)	(−.51)	(−1.43)	(−1.62)
Proportion P.A. Pediatrician	.043	.036	.048	.048	.044	.034	.058	.058
	(1.89)	(1.80)	(1.40)	(1.36)	(1.29)	(1.07)	(2.47)	(2.44)
Proportion P.A. Internal Med., other Med.	*	.071	−.028	.016	*	.056	.118	.130
		(1.38)	(−.33)	(.17)		(.67)	(2.07)	(2.11)
Proportion P.A. General Surgeon	−.020	−.049	−.073	−.115	−.071	−.084	−.054	−.064
	(−.47)	(−1.10)	(−.99)	(−1.47)	(−1.14)	(−1.17)	(−1.14)	(−1.21)
Proportion P.A. OTO	.016	.040	.110	.084	−.025	−.011	−.028	−.021
	(.40)	(.97)	(1.64)	(1.31)	(−.40)	(−.17)	(−.70)	(−.43)
Proportion P.A. OBG	−.040	−.019	.034	.028	−.032	−.014	−.003	−.004
	(−1.35)	(−.73)	(.75)	(.60)	(−.71)	(−.33)	(−.10)	(−.13)
Proportion P.A. other surg. spec.	.028	.071	.038	.034	−.074	−.009	.069	.059
	(.50)	(1.40)	(.45)	(.37)	(−.91)	(−.11)	(1.17)	(.97)
Proportion P.A. other specialty	−.022	−.033	−.051	−.056	−.016	−.037	−.052	−.433
	(−1.08)	(−1.52)	(−1.41)	(−1.45)	(−.55)	(−1.02)	(−2.45)	(−1.63)
Constant	5.691	7.603	5.829	4.927	2.599	4.652	5.110	5.302
	(6.08)	(6.65)	(3.43)	(2.42)	(1.87)	(2.50)	(5.59)	(3.85)
R^2	.974	.984	.943	.948	.943	.955	.966	.969
(Significance)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
$\bar{R}^2$	.965	.974	.920	.920	.921	.929	.952	.951

* F level below critical value

Questions and Answers

Question: The California study was conducted during only one quarter of a year. This raises the issue of seasonal bias in the case-mix. Also, diagnostic categories are only one step in case-mix; the second step is some appreciation of the variance in cases. What is your thinking about this?

Mark Pauly: We looked at all hospitals during the same period of time. They would all have been subject to the same bias. That would only matter if there were differences in the seasonal bias when one hospital was compared to another.

Question: Were the 50 hospitals spread out over California intended to be a random sample of California hospitals?

Mark Pauly: No, they were just the hospitals that subscribed to these two services (American Hospital Association's HAS program and the California Health Data Corporation).

Comment: I'd like to hear more about surgeon and pediatrician costs.

Mark Pauly: The result that supports the conclusion presented in our paper is the difference in regression coefficients between pediatricians and general surgeons. This indicates that one is plus and one is negative. The interpretation of the coefficients on surgeons is not at all clear. We speculate that it may reflect the fact that a surgeon is, in a way, hospital based. Surgeons spend more time at the hospital than most of the other classes of physicians that were examined. Since surgeons are to some extent more hospital oriented, they might be expected to be more careful in terms of what is done to their patients and in terms of when the patient is discharged.

Comment: Physicians evidently do play an important role in decision-making in hospitals. Something like rate regulation may not be the best way of improving efficiency in the institutions. If we believe that hospitals act as the physician's cooperative, and that physicians are making decisions in order to maximize their joint incomes, it strikes me that universal rate regulation potentially would have a very great influence, even though indirect, on physicians' behavior. They do have a very strong incentive to maintain the hospitals functioning and will respond to this incentive. I'd be interested in expansion on this last point.

Mark Pauly: The way in which you would regulate rates would be different if you view the medical staff as having decision-making power as opposed to a situation in which you ignore it. The question is if a hospital has higher than average costs, how could rates be set in such a way as to induce the hospital to lower costs or, are those costs reducible at all?

Question: There could be a rate structure that says something about surgeons and what will be done about the output of surgeons or how you're going to reimburse for nursing services on the floor. Is that the kind of specificity you're talking about?

Mark Pauly: I think you might want to take into account the characteristics of the medical staff in determining the rate.

Question: Would you seriously want to reward hospitals that had the most expensive staffs?

Mark Pauly: I am assuming that you 're not going to get rid of the physicians and you're going to continue to let them practice in hospitals.

Question: Wouldn't that encourage all hospitals to upgrade the "quality" of their physicians?

Mark Pauly: I don't think you want to reward hospitals for having more expensive physicians, you just don't want to punish them.

Question: Aren't you more concerned about the output? What about the input from a regulatory standpoint?

Mark Pauly: You're concerned about the total amount of output, but I think you are also concerned about both output and input. One of the problems of a physician's staff cooperative is controlling its individual members. In a sense, reimbursement policy could help by permitting some financial incentives to be concentrated on individual members.

Comment: I think everybody knows physicians have had some effect on hospital behavior and cost. The question is whether rate regulation could have any effect. It strikes me, theoretically, that it could have a tremendous effect.

Mark Pauly: Few people have looked at rate regulation analytically. In the practical sense, designing a reimbursement policy involves knowing more than theory. The needs include knowing what the parameters are, something which we know little about.

Comment: I would like to follow-up the previous question and ask how you found that pediatricians were so expensive? I have an explanation: Pediatric wards are almost empty. If you have 50 pediatricians on your staff and 2 children in the pediatric ward, this obviously drives up your cost. But it is not a realistic assessment of who is generating costs in hospitals.

Mark Pauly: I suppose that explanation is possible. The only other nuts-and-bolts explanation I have been able to think of has to do with output being measured by admissions. It is possible that the effect of the proportion of general surgeons or the proportion of pediatricians has nothing to do with what the people are doing day by day, but with the way in which they influence the corporate decision-making of the hospital. A hospital dominated by general surgeons may have all of its physicians treating patients differently from a hospital dominated by pediatricians.

Comment: My interpretation of the pediatrician coefficient is that it may be a proxy for some other aspect of the case mix. Nothing in the theory predicts the coefficient for general surgeons.

Mark Pauly: I think that the pediatrician one is easy to understand. I think that it shows possibly that children are more expensive to treat than adults because of the excess capacity. There is much in-hospital surgery, such as tonsillectomies, that is not expensive. It's not a measure of the amount of surgery, it's a measure of patients. I did insert the proportion of discharges, surgically treated, as another variable.

Comment: The president of the children's hospital in the study has the second highest cost per day and per patient in the State. In that case the costs may reflect not just low occupancy rates but also the fact that when he gets children they are very sick. The child you typically see may be an easy, cheap case, but this hospital may find a large fraction of children with very severe conditions.

Study of Reimbursement and Practice Arrangements of Provider-Based Physicians

by Thomas Shaffert, Samuel Mitchell, and Robert Schlenker

Objectives

The primary objective of this study was to obtain financial and related data on certain categories of hospital-based physicians (HBPs). We analyzed these data in terms of how both HBPs' earnings and HBPs' contractual relationships vary according to characteristics of the hospitals and the geographic areas in which they are located. These characteristics include, among others: teaching status, number of hospital beds, urban or rural location, and the extent to which the hospital is reimbursed by third-parties on a cost-related basis. Phase I of the study addressed this objective for three HBP specialties—radiology, pathology, and anesthesiology.

As the study progressed, the objectives became refined based upon our preliminary findings. Phase II of the study addressed these refinements. The objective of the first refinement was to extend the phase I descriptive analysis into two additional HBP specialties—cardiology and emergency room. The objective of the second refinement was to gain a better understanding of the factors affecting the amounts of compensation received by HBPs, and the types of arrangements under which they are compensated, by means of an iterative multivariate analysis. The objective of the third refinement was to examine on an exploratory case study basis how New York State's prospective reimbursement system has affected HBPs and the hospitals in which they have practiced since 1970. We also wanted to explore the impact of possible policy changes and to verify some of the preliminary findings of the study. The fourth refinement was to provide HCFA's Office of Research, Demonstrations, and Statistics with recommendations for further research in any area related to the study.

Scope

The study consisted of two phases. Phase I of the study involved a major data collection effort which covered 120 hospitals, 600 departments, and 400 contracts. The data, covering each hospital's fiscal year ending in 1975, included 2,600 hospital-based physicians (HBPs) who worked 1,300 full-time equivalent (FTE) manyears in the participating hospitals. There were 500 radiologists, 425 pathologists, 291 anesthesiologists, 612 cardiologists, 418 emergency room physicians, and 382 other specialists in the sample. Phase I included a comprehensive descriptive analysis of the relationships among the amount of compensation per full-time equivalent hospital-based physician, the types of compensation arrangements, and various hospital, departmental, contractual and other characteristics for three HBP specialties—radiology, pathology and anesthesiology. Phase I also included a descriptive analysis of 185 written contracts between hospital and either individual or groups of HBPs.

The first aspect of the Phase II work was the extension of the Phase I descriptive analysis into two additional specialties, cardiology and emergency room. The second aspect of Phase II applied multivariate analysis to the data collected during Phase I for four specialties—radiology, pathology, cardiology, and emergency room. The descriptive analysis described above was limited to tabular comparisons of pairs of variables. The multivariate analysis performed in this segment made it possible to analyze simultaneously the effects of a number of different variables on either the amount of compensation per full-time equivalent hospital-based physician or the type of compensation arrangement.

The third aspect of Phase II (the exploratory case studies of the effects of prospective reimbursement on HBP compensation and practice arrangements in New York State) consisted of the collection of information from 10 New York State hospitals through interviews and the accumulation of financial data during visits to the hospitals. These data were then examined to determine how the New York prospective reimbursement system has affected HBPs and the hospitals in which they practice. The interviews conducted during these exploratory case studies were also used to verify certain key findings and assumptions of previous portions of the study. In addition, the potential impact of policy changes affecting HBPs was explored. Finally, throughout the study a number of areas for possible further research were identified.

Major Findings

Descriptive Analysis of Radiology, Pathology, and Anesthesiology

Before presenting the major findings from this aspect of the study, it is important that several key definitions and underlying data characteristics be stated.

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- The only hospital-based physician (HBP) compensation data available to us was that paid by the sample hospitals. Other possible sources of income (such as other hospitals, private practice, professorships, publications and consulting fees) are not reflected in our findings, except to the extent that they may be incorporated in the conversion to full-time equivalent earnings.
- To facilitate comparative analysis, the compensation amounts reported for all HBPs who worked less than full-time in a sample hospital have been converted to a full-time equivalent (FTE) basis.
- The analysis excludes all HBPs who billed patients directly, because in these cases the sample hospitals had no knowledge of the HBPs' earnings.
- In general, the term "percentage arrangement(s)" includes all arrangements in which physician remuneration is calculated by applying a percentage factor (which can vary considerably among contracts) to *either gross* or *net* departmental revenue. The differences between gross and net departmental revenue also vary among contracts, but often include deductions for departmental bad debts, contractual allowances, charity care, hospital employee services, and professional courtesy.
- The analysis includes comparisons of the remuneration of salaried HBPs versus those on percentage arrangements. These remuneration amounts may not be directly comparable because of the difference between "net" and "gross" income. The remuneration paid under a salary arrangement often represents "net" income to the HBP. In the case of a percentage arrangement the remuneration usually represents "gross" income. Out of this gross income the HBP typically must pay for a variety of fringe benefits and malpractice insurance, and occasionally for certain costs of operating the department. However, one of the major findings of several segments of this study is that the additional costs borne by HBPs on percentage contracts are not large enough to account for the significantly higher remuneration received under percentage arrangements versus salary arrangements.

With these explanations in mind, the major findings for the specialties of radiology, pathology, and anesthesiology are summarized below:

- These three specialty departments contribute significantly to the total gross charges (23%) and total fully-allocated costs (17%) of their hospitals.
- Total HBP remuneration represents a significant portion of the total direct costs in these departments (ranging from under 30% in pathology to over 70% in anesthesiology).
- Average earnings per full-time equivalent hospital-based physician were: radiologists—$103,200, pathologists—$98,400, and anesthesiologists—$80,000. (Table 1)
- The average FTE earnings of HBPs are closely associated with the type of compensation arrangement. Salary arrangements are associated with lower average FTE earnings (e.g., $52,600 for radiologists) and percentage arrangements with higher average FTE earnings (e.g., $124,400 for radiologists). (Table 2)
- Salaried physicians are very prevalent in teaching hospitals. Thus, HBPs in teaching hospitals have lower average FTE earnings than in nonteaching hospitals. (Table 3)
- HBPs in small hospitals tend to earn more on an FTE basis than those in medium and large hospitals. (Table 4)
- Average FTE earnings vary by region. There are generally higher averages in the West (e.g., $141,600 for pathologists) and North Central regions, and lower earnings in the South and Northeast (e.g., $71,300 for pathologists). (Table 5)
- A hospital-based physician's average FTE earnings appear to be higher the greater the share of the hospital's revenues from cost reimbursement payers.
- The average FTE earnings of HBPs are closely associated with the gross revenues and net revenues (gross revenues less allowances, discounts, bad debts, and charity) of the departments in which they work.

Some qualifications should also be considered when reviewing the findings for the contract analysis. First, since our analysis was restricted to written contracts, the findings may be somewhat biased. Second, since each contract is unique in some significant aspect and since they vary widely in their formality and specificity, generalization was difficult. Finally, our sample of contracts may not be representative of all HBPs because it was not selected randomly.

The major findings of our contract analysis are summarized below:

- A significant percentage of the arrangements between hospitals and HBPs are oral. Written contracts account for less than half of the total number of arrangements between the HBPs and hospitals in our sample.
- Salary compensation arrangements are agreed on orally; percentage arrangements are more likely to be written contracts. As a result, the contracts which were analyzed were predominantly percentage arrangements and our findings apply primarily to them.
- Approximately 75% of the contracts were with group practices or physicians who might form a group practice.
- The primary finding in relation to our analysis of the descriptive tables was that HBPs compensated under a percentage arrangement tend to receive far fewer fringe benefits, and pay more of their department's expenses, than do HBPs compensated under a salary arrangement. This finding tends to reduce some of the significance of the large differences found in our descriptive analysis between the average FTE compensation of these two types of compensation arrangements.

Descriptive Analysis of Cardiology and Emergency Room

The explanations presented above for the Phase I descriptive analysis also apply to the descriptive analysis of cardiology and emergency room performed in Phase II.

The major findings of the descriptive analysis of the cardiology and emergency room specialties follow:

Table 1
FTE Compensation Amounts by Specialty

Specialty	Sample Size	FTE Earnings ($1,000)		Percent of HBPs with FTE Earnings of			
		Average	Std Dev	< 50K	50K–100K	100K–150K	> 150K
Radiology	358	$103K	$62K	19%	35%	32%	15%
Pathology	367	98K	68K	27	41	17	16
Anesthesiology	105	80K	33K	13	64	21	2
Cardiology	579	63K	56K	45	44	6	5
Emergency Room	350	55K	28K	59	35	5	1

Table 2
Compensation Arrangements by Specialty

Specialty and Compensation Arrangement		Sample Size	Average FTE Earnings	Percent of HBPs with FTE Earnings of			
				<50K	50K–100K	100K–150K	>150K
Radiology	—Salary	78	53K	63	35	3	0
	—Percentage	181	124K	1	34	37	26
Pathology	—Salary	114	49K	68	31	1	0
	—Percentage	156	138K	0	44	25	31
Anesthesiology	—Salary	57	62K	23	68	9	0
	—Percentage	19	87K	5	47	47	0
Cardiology	—Salary	46	40K	91	9	0	0
	—Percentage	51	86K	4	71	16	10
Emergency room	—Salary	108	40K	83	17	0	0
	—Percentage	80	75K	30	66	4	0

Table 3
Compensation Amount and Type by Hospital Teaching Status

Specialty and Hospital Teaching Status*		Sample Size	Average FTE Earnings	Percent >100K	Percent Compensated by	
					Salary	Percent
Radiology	—T	192	$ 90K	37%	41%	35%
	—N-T	166	119K	57	0	69
Pathology	—T	194	67K	13	53	20
	—N-T	173	133K	53	6	68
Anesthesiology	—T	55	80K	13	47	20
	—N-T	50	81K	34	62	16
Cardiology	—T	277	59K	7	14	7
	—N-T	302	66K	14	2	11
Emergency Room	—T	117	49K	0	25	27
	—N-T	233	58K	9	34	21

* T: Teaching
N-T: Non-Teaching

Table 4
Compensation Amount and Type by Hospital Bed Size

Specialty	Hospital Size	Sample Size	Average FTE Earnings	Percent of HBPs on Salary	Percent of HBPs on Percent
Radiology	<100 Beds	39	$125K	0%	97%
	100–299 Beds	146	111K	6	60
	>299 Beds	173	91K	40	32
Pathology	<100 Beds	28	108K	7	43
	100–299 Beds	137	143K	10	71
	>299 Beds	202	67K	49	23
Anesthesiology	<100 Beds	13	57K	85	8
	100–299 Beds	28	88K	57	0
	>299 Beds	64	81K	47	28
Cardiology	<100 Beds	119	54K	0	1
	100–299 Beds	178	61K	5	16
	>299 Beds	282	68K	13	8
Emergency Room	<100 Beds	25	40K	16	32
	100–299 Beds	170	59K	40	19
	>299 Beds	155	52K	23	26

Table 5
Regional Differences in FTE Compensation Amount

	West		North Central		South		Northeast	
Specialty	Sample Size	Average FTE Earnings	Sample Size	Average FTE Earnings	Sample Size	Average FTE Earnings	Sample Size	Average FTE Earnings
Radiology	109	$129K	87	$110K	66	$88K	96	$78K
Pathology	101	142K	93	82K	99	90K	74	71K
Anesthesiology	3	168K	28	86K	46	72K	28	78K
Cardiology	89	70K	119	90K	306	52K	65	55K
Emergency Room	137	67K	73	51K	77	50K	63	38K

- These two specialty departments contribute approximately six percent to the total gross charges and approximately five percent to the total fully-allocated costs of their hospitals.
- Total HBP remuneration represents a significant portion of the total direct costs in these departments (approximately 65 percent in cardiology and 49 percent in the emergency room).
- The average FTE compensation amounts for cardiologists and emergency room physicians in the sample are considerably lower than those found earlier for radiology, pathology and anesthesiology. The average for cardiologists is $63,000; the average for emergency room physicians is $54,700. (Table 1)
- As with the other specialties, the type of compensation arrangements appears to be closely associated with the amount of compensation. The percentage arrangements are associated with higher average FTE compensation amounts (e.g., $74,900 for emergency room HBPs) than are the salary arrangements (e.g., $40,400 for emergency room HBPs). (Table 2)
- The findings relating amount and type of compensation to hospital characteristics such as teaching status, bed size, and SMSA location did not reveal any significant differences. There is a slight tendency for FTE compensation amounts to be higher in nonteaching than in teaching institutions (Table 3). In contrast to the findings for the other specialties, FTE compensation amounts were, on the average, lowest in small hospitals (Table 4). Little difference was found in average FTE compensation amounts between SMSA and non-SMSA locations, although the sample sizes in the non-SMSA areas were quite small.
- Average FTE compensation amounts vary by region, with generally higher averages in the West (e.g., $67,100 for emergency room HBPs) and the North Central regions, and lower compensation amounts in the South and Northeast (e.g., $38,300 for emergency room HBPs). (Table 5)

- With regard to cost reimbursement and prospective rate setting, the data indicate an association between high levels of cost reimbursement and the absence of prospective rate setting on the one hand, and higher average FTE compensation amounts on the other hand. However, as noted in the text, these differences in averages can be due to many other factors in addition to cost reimbursement and prospective rate setting.
- Finally, as is the case with the specialties examined previously, the FTE compensation amounts of the HBPs are positively associated with the revenues per FTE of their departments. As these FTE revenues increase, so do the FTE compensation amounts of the HBPs.

Multivariate Analysis of Radiology, Pathology, Cardiology and Emergency Room

With regard to the multivariate analysis, two qualifications should be kept in mind. First, the wide variety of HBP compensation arrangements meant that we could use only fairly small samples when we looked at pure salary and pure percentage departments. Secondly, there were statistical problems caused by the high intercorrelation of variables (multicollinearity) that made a causal interpretation of the role of specific variables difficult.

The major findings for the multivariate analysis follow. The general findings apply primarily to the specialties of radiology and pathology, since we conducted only overview analyses of the cardiology and emergency room specialties.

- Regression results for amount of compensation reinforce the findings from the descriptive analysis that, even after controlling for a considerable number of other factors, the difference between the salary arrangement and the percentage arrangement remains. The difference in compensation amounts appears to be greater than could be accounted for by the fact that HBPs under a percentage arrangement usually have to pay for their own fringe benefits, malpractice insurance, and occasionally certain costs of operating their departments.
- Hospital and area characteristics are more powerful in explaining differences in the type of compensation arrangement between hospitals and HBPs than they are in determining the amount of compensation. The variables which are statistically significant generally conform to the hypothesis that labor market conditions and bargaining power are major factors in determining the type of compensation arrangement. The most important characteristics were region, teaching status, hospital size, and the physician-bed ratio. These were also the primary variables for which major differences were revealed in the earlier descriptive analysis.
- Certain hospital and area characteristics, which in the descriptive analysis appeared to be related to differences in amount of compensation and type of arrangement, were not statistically significant in the multivariate analysis. Examples of these variables are SMSA location, the percentage of hospital revenues obtained through cost reimbursement, and the percentage of hospital revenues controlled by a formal prospective rate setting program.
- Using the cost after stepdown variable as our proxy measure for the complementary inputs with which the HBP works, it does not appear that the percentage arrangement leads to a greater use of complementary inputs than does the salary arrangement.
- The major variables in statistically determining the amount of compensation of HBPs are the type of compensation arrangement and our measure of complementary inputs.
- The role played by our measure of complementary inputs in determining the amount of HBP compensation differs according to the type of compensation arrangement. For those under a percentage arrangement the amount of compensation and the cost after stepdown are directly proportional to one another. In contrast, for those on a salary, the amount of compensation does not rise as other departmental costs rise.

Exploratory Case Studies of the Effects of Prospective Reimbursement on HBP Compensation and Practice Arrangements

The third segment of Phase II, the exploratory case studies of prospective reimbursement (PR) in New York State, revealed several significant findings. However, four qualifications should be kept in mind. First, the sample was selected through the Hospital Association of New York State and therefore was not random. The sample reflects a bias toward large, urban hospitals with relatively strong financial positions. Second, the interviews included only hospital administrators and physicians. As a result, there is a bias toward their point of view. There were no interviews included to account for the State's viewpoint. Third, the findings are primarily the result of conversations with those in administration and those physicians who were available to speak with us on the day we visited each hospital. As a result, the types of people interviewed varied from hospital to hospital, and the findings may suffer some bias. Last, there is a possibility of a causal fallacy in the study. Despite our attempts to identify the effects of PR, other independent factors may well influence some of the variables examined.

Following are some of the major findings of the exploratory case studies. The hospital prospective reimbursement system has the following effects on hospital-based physicians:

—It contributes to a tendency for the hospitals to limit HBP remuneration,
—It creates incentives for the HBPs to shift to a direct billing arrangement, and
—It helps create an atmosphere that is not conducive to attracting HBPs to the State, or to retaining those that currently practice in New York.

- The hospital administrators voiced their opinions that the PR system has:
  —helped cause cutbacks in teaching programs,
  —improved the hospitals' dealings with suppliers,
  —strengthened the hospitals' bargaining position with HBPs and other hospital personnel,
  —limited capital expenditures in many areas,
  —contributed to the cutback and elimination of services,
  —produced hospital inefficiencies as far as the total health care system is concerned,

—contributed to the reduction of the hospitals' nonoperating reserves, and
—contributed to a trend that may have a negative effect on the quality of care in some departments.

- Some of the key findings and assumptions of earlier segments of the study were validated:
  —the use of a 2,080 hour year (40 hour week) as a definition of one FTE HBP was widely accepted by administrative personnel, but felt to be low by many HBPs,
  —the approach used to convert all HBP compensation to an FTE basis was generally accepted,
  —our understanding of the types of fringe benefits received by salaried HBPs and expenses paid by HBPs on percentage arrangements was confirmed,
  —the cost of annual malpractice insurance premiums paid by radiologists, pathologists, and emergency room physicians ranged from $600 to over $3,000, and
  —in no case did the interviewed HBPs on percentage arrangements pay for any of the significant operating expenses of their departments out of the compensation they received from the hospitals.
- With regard to policy alternatives:
  —the possibility of eliminating percentage arrangements was generally accepted,
  —the possibility of limiting HBP compensation to salary plus legitimate expenses met mixed reactions, and
  —the possibility of requiring the disclosure of each HBP's total income was uniformly opposed.
- Despite the fact that the majority of the hospitals interviewed were in a relatively strong financial position, many had suffered operating losses during the past three years.

Questions and Answers

Question: The anesthesiologists should be eliminated to make your paper more conclusive and meaningful. They're not really hospital-based physicians in the true sense of the word. Ninety-three percent of anesthesiologists in this country do direct billing services. In the West there was a tremendous jump in anesthesiologists' income. It might be explained that their overhead in California is fantastically high. Their malpractice premiums run up to and include $42,000 per physician. Could there be some type of systematic relationship between compensation arrangement and hospital size?

Sam Mitchell: We linked full-time salaried hospital-based physicians to hospital size, and there is considerable difference by size. The figures for radiology indicate that 85 percent of salaried hospital-based physicians in larger hospitals were full-time, whereas in small hospitals, just slightly over 25% were full-time.

Question: Were you able to obtain standardized measures of output?

Sam Mitchell: We had great trouble getting hold of any reasonable output measures that were consistently applied from hospital to hospital and department to department. There were none. We gathered output data, and analyzed it but concluded that the data were so inconsistent that further analysis was worthless.

Question: As I understand Medicare reimbursement procedures, some of the hospital-based physicians can either bill directly and get full charges or go to the hospital and get 80 percent of charges. If any of the hospital-based physicians billed directly, were they automatically excluded?

Sam Mitchell: If there was any significant direct billing income that we knew we were lacking, we eliminated that group or that physician entirely from the analysis.

Question: How were outpatient facilities and variations of outpatient facilities handled?

Sam Mitchell: They were not.

Question: Looking at the data for salaried physicians, was any attention paid to the old civil service "time in grade" concept? I'm thinking of university hospitals where often radiologists and pathologists who are salaried tend to be younger. As you get older, you move out into a mixed private and salaried practice.

Sam Mitchell: No, we did not get age or length-in-service characteristics of the physicians themselves, unfortunately. That would have been an interesting analysis. We did distinguish between department heads and non-department heads, particularly in the salaries. The salaried department heads clearly had higher average earnings than the non-department heads.

Question: Did you deal with the problem of geographical versus full-time salaried individuals? There's a concept called geographical full-time which means a physician is salaried on a full-time basis. If any of this is reflected in your data, it could be terribly damaging. You give us no comparisons with fee-for-service. It seems that what you're documenting is that you tighten down instead of driving people into less lucrative arrangements. You drive them into an area on which you can give us no data.

Sam Mitchell: We have not attempted to reach any sweeping policy conclusions in this work. We were essentially trying to gather facts and report on the facts. We have never recommended putting all physicians on a salary arrangement or excluding any other types of arrangements.

Comment: I'm speaking as a self-appointed defense lawyer for Arthur Andersen and wish to clarify a few points. First, geographic full-time physicians, which means salaried plus direct billers, were not included in this analysis. Second, with regard to malpractice, I would like to cite national estimates of malpractice expenses from a colleague's survey. Pathologists' malpractice expenses were $1500 a year, while radiologists' were slightly higher. Anesthesiologists' malpractice expenses were about $4200 in 1975. Now, I think an interesting point is that the physicians who allegedly are ordering tests in the name of defensive medicine are the physicians who are not in this sample, largely internists and general practitioners. I might add that their malpractice expenses only slightly exceed their automobile expenses. Third, there is the question of the direction of the bias resulting from the full-time equivalency assumption. Pathologists and radiologists insist they work 50 hours a week, and the Andersen estimates were made on the assumption that they work 40 hours a week. So I think that Arthur Andersen has been rather conservative on this issue. Also, we hear anecdotes that many HBP's have outside practices with incomes which are not included in these figures. Fourth, with regard to practice expenses, many of the expenses of percentage physicians are fringe benefits. HBP's are not paying for auxilliary personnel, nor are they paying for equipment, except in a very few cases. I think, on the other hand, Arthur Andersen failed to mention the fact that if you have a percentage arrangement, you reap the benefits of our tax system for self-employed individuals. When our salaried physician drives his Mercedes to the hospital, it's called consumption. If he's on a percentage arrangement, it's called a business expense. So I think, overall, Arthur Andersen took a very cautious approach in presenting these figures.

Hospital Utilization Effects of Case Reimbursement for Medical Care

by Gene A. Markel

The subject of this paper is an experimental program that Pennsylvania Blue Shield (PBS) conducted which tested an alternative method of reimbursing physicians for in-patient medical services. At Pennsylvania Blue Shield this method initially was called payment by diagnosis, but later came to be known as per-case reimbursement (PCR).

Traditionally, physicians are reimbursed for in-hospital medical care on a disaggregated fee-for-service basis. This involves separate payment increments for each hospital visit, each medical examination, and other similar medical services provided by the attending physician. Since the physician's income under a fee-for-service arrangement depends upon the number of services rendered, there would appear to be some financial incentive for the physician to deliver as many services as possible. Ultimately, this may be translated into an incentive to extend hospital stays—or at least to forego opportunities to reduce length of stay.

If it is true that physicians—either consciously or unconsciously—sense and respond to such incentives, then it may be hypothesized that a prospective and somewhat more global approach to paying the doctor should yield shorter hospital stays and reduce the overall costs per case. Specifically, in our experiment, the primary attending physician was paid what we thought to be an equitable fixed payment allowance for a whole case. Only the disease was considered and not the specific length of treatment. We believed that these kinds of incentives would lead to reductions in length of stay, and in so doing, would reduce the total cost per case. The per-case reimbursement approach is an attempt to capitalize upon the physician's natural desire to accentuate the relationship between his or her work and his or her income within a reimbursement scheme that encourages shorter rather than longer lengths of stay. While the possibilities of such an approach often have been speculated upon, the case reimbursement concept for medical care remained largely untested until the time of our experiments.

Historical Development of the Project

In 1972, Pennsylvania Blue Shield undertook a small project to test some of these concepts at a single hospital located in northeastern Pennsylvania. Fifteen frequently occurring diagnoses were selected for inclusion. A schedule of case payment allowances was developed, based upon Blue Shield claims experience for these diagnoses. Five physicians on the hospital staff participated in the program and agreed to accept case allowances as payment in full for cases involving medical care to Blue Cross/Blue Shield subscribers hospitalized at the participating institution for any of the selected conditions.

This initial exploratory program ran for a period of one year. The results were sufficiently encouraging to lead us to seek a more extensive test of the per-case reimbursement concept. The first stage of expansion was implemented in January, 1974. Hospital participation at this time was broadened to five institutions; and fifty-two physicians participated. These physicians represented approximately half of the combined medical staffs of the participating hospitals.

In July of 1975, with the assistance of a federal research grant from the Health Resources Administration, the experimental program in the field was extended for a period of one additional year, and concurrently was expanded to include a still larger number of hospitals and physicians. The remainder of this paper is concerned with this most recent stage of the experiment.

Description of Experimental Program

The experimental Per-Case Reimbursement program operating in the field during the period July 1, 1975, through June 30, 1976, included a total of ten participating hospitals. One of these hospitals was the site of the original experimental program in 1972. Because of its prior involvement, this hospital's experience was excluded from the data base used in evaluating effects observed in the expanded program. The remaining nine hospitals were dispersed throughout various parts of the state. Two were in the Greater Philadelphia area; three were in eastern Pennsylvania locations; one was located in the central part of the state; and three were located in western Pennsylvania. The participating hospitals were of small-to-medium size, averaged 212 beds, and had a mean occupancy rate of approximately 74 percent throughout the period 1973–1975. These participating institutions provided a reasonably representative cross-section of non-proprietary, non-teaching general community hospitals in Pennsylvania. Conscious effort was made to exclude teaching hospitals and hospitals offering high levels of specialized services, since these might be expected to treat relatively larger proportions of unusual and complicated cases, with corresponding differences in treatment modalities.

Ninety-one physicians on the staffs of these nine hospitals agreed to participate in the program and to accept scheduled PCR allowances as payment in full for qualifying Blue Cross/Blue Shield patients. However, only sixty-one of these doctors actually participated by sending in claims. This sample included thirty-five general and family practitioners and twenty-six specialists. The specialists were principally in internal medicine, cardiology and urology. Physician participation was entirely voluntary.

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Although it might be argued that a population of physicians enlisted on this basis is not necessarily representative of physicians in general, there was little alternative, since there was no effective leverage to assure the cooperation of particular physicians.

Twenty-four disease classifications were included in this stage of the program. The objective was to establish well-defined class sets, in which specific diseases within any given class are reasonably homogeneous, and which occur with sufficient frequency to provide adequate sample sizes. The included disease categories, with corresponding ICDA codes, are listed below.

Diagnosis/Disease Category	ICDA-8	H-ICDA
Arterial embolism and thrombosis, gangrene	444.0–445.9	440.0–445.9
Arteriosclerosis	440.0–440.9	440.0–440.9
Arthritis and rheumatism	710.0–718.0	710.0–718.0
Asthma	493.0	493.0, 493.9
Bronchitis and bronchiolitis, acute	466.0	489.0, 489.1
Bronchitis, chronic and unqualified	490.0–491.0	490.0–491.2
Cerebrovascular disease	430.0–438.9	430.0–438.9
Cystitis	595.0	595.0–595.9
Diabetes mellitus	250.0–250.9	250.0–250.7
Disease of thyroid gland	240.0–246.0	240.0–246.0
Emphysema	492.0	492.0
Gastric, duodenal and gastrojejunal ulcer	531.0–534-9	531.0–534.3
Gastritis and duodenitis	535.0	535.0
Gastroenteritis	009.2	009.2
Hypertension, essential or malignant	400.0, 401.0	400.0, 401.0
Infections of the kidney	590.0,590.1	590.0,590.2
Ischemic heart disease, acute	410.0–410.9	410.0–410.9
Ischemic heart disease, subacute, chronic and asymptomatic; angina pectoris	411.0–414.9	411.0–414.0
Pneumonia	480.0–486.0	480.0–486.0
Pulmonary embolism and infarction	450.0	450.0
Rheumatic heart disease, chronic	393.0–398.0	393.0–398.0
Symptomatic heart disease	427.0–428.0	415.0–416.9 425.2–425.9 427.0–427.9
Thrombophlebitis	451.0–451.9	451.0–451.9
Upper respiratory infection, acute	460.0–465.0	460.0–465.0

Recommended payment allowances were developed for each disease category. This was done by examining data and information on average length of stay for given diagnoses from Hospital Utilization Program (HUP) and Professional Activity Study (PAS) reports, typical patterns of physician services reflected in Blue Shield claims experience, and applicable medical price information from Blue Shield data bases. The physicians who had agreed to participate were given an opportunity to review the proposed payment amounts and a few minor changes were negotiated. Finally, the proposed schedule was reviewed by Pennsylvania Blue Shield Medical Advisors. The resulting payment allowances represented a fair market value for each of the covered medical services and were readily acceptable to the participating physicians. Participating physicians were required to accept the finally established payment levels as payment in full for services delivered under the program.

A number of conditions had to be satisfied for claims to be eligible for payment under the terms of this experimental program:

(a) The patient had to be a Blue Shield subscriber with coverage for in-hospital medical care benefits;
(b) The patient was required to be a medical inpatient at one of the participating hospitals, with a participating doctor serving as the physician primarily in charge of his case;
(c) Hospital admission must have occurred during the experimental period;
(d) The patient's discharge diagnosis must have been one of those included in the program;
(e) Cases involving definitive surgery during the same hospital stay were not eligible for PCR payment;
(f) The patient must have been under 65 years of age;
(g) Cases with length of stay less than two days, or more than 60 days were excluded; and
(h) The patient must have been discharged with the approval of the attending physician, and not transferred to another facility.

Except for certain designed variations described below, these conditions also constituted the criteria used in defining control groups used for comparison.

Research Objectives and Design

The primary objectives of the research and evaluation component of the project were: (1) to obtain quantitative measures of any differences or changes in length of stay (LOS) that might be attributable to the per-case method of reimbursement; and (2) to examine the cost implications of any observed variations in length of stay. The experimental design involved four comparative experience groups.

Group 1 was the experimental group. It consisted of patients with Blue Cross/Blue Shield coverage, and who satisfied all of the qualifying criteria described earlier.

Group 2 was a cross-sectional control group consisting of patients satisfying exactly the same selection criteria, except their costs were not covered by Blue Cross/Blue Shield. As such, these cases would not have been handled under the per-case method of physician reimbursement, but would otherwise constitute a very similar population. These were cases in which the patients were treated for the same range of conditions, by the same doctors, in the same hospitals, during the same period of time as the experimental population.

Groups 3 and 4 were longitudinal reference groups. These groups of patients were treated for the same range of conditions, by the same doctors, and in the same hospitals as Groups 1 and 2, but at an earlier time—1973.

Data for the experimental population were taken from PCR claim forms submitted to Blue Shield by participating physicians. Data for cross-sectional and longitudinal comparison groups were taken from Hospital Utilization Program (HUP) and Professional Activity Study (PAS) records to which the participating hospitals had granted access. Data for all four groups were collected and maintained in such a manner as to permit stratification by diagnosis categories, by specific participating hospitals or physicians, by type of physician provider, and by various patient characteristics.

Average LOS was computed for each diagnostic category at each hospital. Changes or differences in LOS were measured and expressed in terms of simple arithmetic differences between average LOS for corresponding cells in different groups. Since length-of-stay data distributions tend to be markedly non-Gaussian, nonparametric statistical methods were used to determine the significance of observed differences. The analysis focused principally upon measurement of longitudinal changes in LOS occurring between the experimental group and its historical antecedent (Group 3 to Group 1), and upon the comparison of these changes with corresponding changes in the cross-sectional control groups (Group 4 to Group 2).

Cost implications were studied by comparing actual Blue Cross and Blue Shield payments to the payment levels that might have been expected for these same cases if the PCR program had not intervened.

Findings and Conclusions

Forty-five hospital/diagnosis combinations satisfied minimum sample size requirements in all four blocks of the design; and longitudinal changes in average LOS were computed for these forty-five data sets (Table 1). A favorable outcome here may be defined as one in which average LOS showed a greater decline (or a smaller increase) for the experimental group than for the control group. By this definition, approximately half of the observed LOS changes were favorable, and half unfavorable. Looking only at the hospital/diagnosis combinations for which observed changes were statistically significant, however, the outcome was more definitive—indicating nine favorable experimental outcomes, four unfavorable, and one that was for all practical purposes indecisive.

Closer examination of the comparative results revealed some striking differentials in experimental outcomes at different hospital sites (Table 2). To measure the experimental program's effectiveness at any given hospital, the observed LOS change for the experimental group was adjusted by subtracting from it the corresponding control group change. This is assumed to be a reflection of the background trend in LOS at that hospital. Using this "net change" concept, four of seven hospitals that produced enough data to be evaluated showed changes favorable to the PCR experimental group. Two of the PCR experimental groups showed changes more favorable to the control group (one of which had an extremely small base of experience and should perhaps be disregarded); and one showed no substantial difference between experimental and control group changes. Net reductions in average length of stay at sites more favorable to the PCR group ranged from 14 to 30 percent.

Ranking the experimental hospital sites on the basis of observed PCR effectiveness, and then also ranking them on the basis of their 1973 (pre-experimental) occupancy rates, the two sets of rankings were found to be strongly correlated. This indicates that PCR apparently is most effective in reducing LOS at hospitals with lower *a priori* occupancy rates. It supports a hypothesis that hospitals with low occupancy rates may seek to maintain higher occupancy by tolerating some slack in their lengths of stay; and that PCR then is effective primarily in reducing this slack to whatever degree it exists.

The cost implications of LOS changes are shown on Table 3. This table displays a summary of the differences between actual and expected Blue Cross/Blue Shield payments for experimental cases at each of the six hospitals yielding enough experience to be so evaluated. Two of these experimental sites show apparently adverse financial results. To explain these negative outcomes, it may be noted that the bad financial outcome at hospital E arose from the fact that average LOS increased for both the experimental and control populations. The LOS increase for the experimental group, however, was considerably less than for the control gorup; and in this sense, the PCR method was in fact successful here. At hospital D, it was found that a fairly large expansion had been undertaken between 1973 and 1975. It can be conjectured that there may have been great pressure here to maintain the occupancy rate, contrary to PCR incentives.

In general, the PCR method of reimbursement can be expected to result in higher levels of Blue Shield payout to physicians. This does not mean that physicians are being granted a price increase for services delivered to PCR patients. The incremental Blue Shield payout more correctly should be seen as the difference between a "full payment" plan and Blue Shield's normal reimbursement schedules (which frequently provide less than full payment). It represents that portion of the physician's total charge that otherwise would be an out-of-pocket expense for the patient, if it is paid at all.

At those hospitals where an LOS reduction is acheived and is greater than the reduction that might otherwise have been expected on the basis of prevailing LOS trends, the increased Blue Shield payment to physicians is more than compensated by reduced Blue Cross payments to the hospitals. A favorable trade-off is always assured by the simple fact that an inpatient hospital day costs considerably more than does a physician's hospital visit. The difference between those two cost components becomes the dollar value of each day of hospital utilization saved.

In summary, results obtained from the PCR experimental program provide reasonably conclusive evidence that the case method of reimbursement can be effective in promoting shorter lengths of stay for inpatient medical cases. The effectiveness of this method of reimbursement varies quite greatly, however, from one hospital to another. Although the reasons for these differences in response to PCR are not entirely clear, they can be explained at least partially by the hospitals' *a priori* occupancy rates. One can conclude that hospitals with lower occupancy rates tend to have more slack in their average lengths of stay, and that the case method of reimbursement is effective primarily in reducing this slack to whatever extent it may exist.

Table 1
Longitudinal Changes in Length of Stay for Experimental and Cross-Sectional Populations (Change from 1973 to experimental period, 7/75–6/76)

	LOS Change (Days)*	
Hospital/Diagnosis Category	Experimental Population	Cross-Section Population
Hospital A		
Asthma	−5.4 *	−3.5 *
Bronchitis and bronchiolitis: acute	+0.3	+0.4
Diabetes mellitus		
Ulcer: gastric, duodenal, etc.	+0.5	+0.1
Gastritis and duodenitis	−1.8 *	−1.9 *
Gastroenteritis	−1.2 *	0.0
Ischemic heart disease:	−0.8	−0.1
acute	−2.5	+0.8
Ischemic heart disease: subacute, etc.	−1.0	−0.7
Pneumonia	−0.2	0.0
Symptomatic heart disease	+1.5	+0.4
Thrombophlebitis	−4.3 *	−0.5
Upper Respiratory infection	+0.6	+0.5
Hospital B		
Gastroenteritis		
Ischemic heart disease:	+0.6	−0.2
acute	−1.5 *	+3.6
Ischemic heart disease: subacute, etc.	+1.1	−0.3
Hospital C		
Bronchitis and bronchiolitis: acute	−1.7	−3.2
Ulcer: gastric, duodenal, etc.		
Ischemic heart disease:	−2.0 *	−1.8
acute	−2.8 *	+0.6
Ischemic heart disease: subacute, etc.	−0.2	−0.1
Pneumonia	−2.0	−1.2
Symptomatic heart disease	−0.7	+3.2
Hospital D		
Bronchitis: chronic/ unqualified	+0.7	−1.1
Cerebrovascular disease	−4.0	−7.8
Diabetes mellitus	−5.1 *	−1.0
Gastroenteritis	−0.6	−0.8 *
Hypertension	+5.3	−1.0
Ischemic heart disease: acute	+1.2	−2.0
Ischemic heart disease: subacute, etc.	−2.5	−0.7
Pneumonia	+0.4	−0.7 *
Symptomatic heart disease	−0.8	−2.4
Upper respiratory infection	+0.2	+0.1
Hospital E		
Bronchitis and bronchiolitis: Acute	−1.3	−2.0 *
Gastroenteritis	+0.7	−1.4 *
Ischemic heart disease: subacute, etc.	+0.3	0.0
Pneumonia	−0.4	+3.6
Hospital F		
Asthma	+0.5	+0.2
Bronchitis and bronchiolitis: acute	−1.1	+0.2
Bronchitis: chronic/ unqualified		
Diabetes mellitus	−0.5	−1.0
Gastroenteritis	+1.6	0.0
Hypertension	−0.6	+0.2
Ischemic heart disease:	−4.0 *	+1.6
acute	−0.9	+3.0 *
Ischemic heart disease: subacute, etc.	+0.2	−0.1
Pneumonia	+1.2	−0.1
Hospital G		
Pneumonia	+0.8	+0.2

* Indicates LOS change is statistically significant at the .10 level.

Table 2
Average Change in Length of Stay, by Hospital

		LOS Change from 1973 to 7/75–6/76 Period			
		Experimental Population		Cross-Section Population	
Hospital	Number of Diagnosis Categories Rerpesented	Days	% Change	Days	% Change
A	12	−1.6	−19%	−0.4	− 5%
B	3	−3.1	−28%	+0.2	+ 2%
C	6	−1.9	−24%	−0.8	+10%
D	10	−0.1	− 1%	−0.8	−11%
E	4	+0.1	+ 2%	+1.3	+20%
F	9	+0.3	+ 4%	+0.6	+ 3%
G	1	+0.9	+14%	+0.2	+ 3%
Overall	15	−0.2	− 3%	0.0	0%

Table 3
Summary of Differences Between Actual and Expected Payments, by Hospital

		Gain (LOSS) For Program			Gain (LOSS) as Percent of Expected Payment		
Hospital	Experimental Cases Represented	Blue Shield	Blue Cross	BC/BS Combined	Blue Shield	Blue Cross	BC/BS Combined
A	249	($ 860)	$ 9,273	$ 8,413	(3.7%)	6.1%	4.8%
B	82	($1,335)	$ 6,414	$ 5,079	(15.5%)	7.0%	5.1%
D	82	($ 94)	$ 1,469	$ 1,375	(1.2%)	2.1%	1.8%
D	176	($ 277)	($12,184)	($12,461)	(1.7%)	(8.3%)	(7.6%)
E	92	($ 801)	($ 2,819)	($ 3,620)	(10.3%)	(4.6%)	(5.3%)
F	144	$2,697	$ 5,997	$ 8,694	19.3%	4.7%	6.1%

Second Surgical Opinion: Update

by Eugene G. McCarthy and
Madelon Lubin Finkel

Introduction

Second opinion elective surgery programs provide a mechanism for obtaining at least one additional surgical consultation by a Board certified surgical specialist for patients who have been recommended for elective surgery.[1] Second opinion elective surgical programs remove the financial barrier for the patient by having the full cost of the consultation and all ancillary tests required to complete the consultation paid for by the sponsoring agency or third party insurer. The consultants are usually paid $50 by the second opinion sponsors. It is postulated that the screening of elective surgery cases will not only enhance the quality of care rendered, but will also contain costs. Hence, quality of care and cost containment could be brought about jointly through the screening of potential surplus surgery.

The objective of these programs is to screen those procedures which are either uncalled for at the time of consultation but might be necessary at a future time ("wait and see conditions"); those which may be treated medically rather than surgically; or those which are considered to be unjustified on the basis of diagnostic testing. However, it should be made clear that second opinion programs are neither designed to measure the reliability of physician's recommendations for surgery nor to show that one physician is correct in his or her judgment and another is not. Indeed, Koran, in his comprehensive review of studies of physician reliability, clearly indicates the difficulty inherent in peer review studies (Koran, 1977). The quantitative measurement of physician differences is not the objective of second opinion programs.

The Cornell Second Opinion Program

The implementation of second opinion programs is a phenomenon of the 1970's. Although the first formal second opinion program was established in the early 1950's by the United Mine Workers' Fund, this program was short-lived and statistics on program performance have never been published. The first program of any real consequence was started in New York City by Cornell University Meidcal College and several Taft-Hartley security welfare funds. This prospective outcome study has been in continuous operation since 1972.[2]

There are two types of second opinion programs: voluntary and mandatory. The former implies that an individual recommended for elective surgery voluntarily contacts the sponsoring agency to schedule a consultation. In the mandatory programs, all those recommended for elective surgery must seek a second opinion in order to receive benefits; however, a forgiveness' component is included whereby benefits will be paid even if the individual undergoes surgery without having had a consultation. Should elective surgery be recommended and performed a second time for a related or an unrelated condition and the individual does not seek a second opinion, benefits will not be paid.

It is estimated that only 10–15 percent of those eligible seek a second opinion voluntarily while 85 percent of those eligible in the mandatory programs do so. Obviously a more accurate cross-section of surgical procedures is seen under mandatory second opinion programs. Patients in the voluntary group usually opt for a second opinion if they are faced with major surgery. These individuals, for a variety of reasons, may question the efficacy or the outcome of surgery and seek a second opinion. Or these individuals may not want surgery and are seeking reassurance that no surgery is the right course of action.

Those who either request or require a second opinion contact their respective security welfare fund. The individual, given a choice of surgeons, selects one and has an appointment scheduled by the security fund intake officer. The consultants, all Board certified, represent all of the surgical subspecialties. The panel is closed; all consultations must be made with surgeons who have been screened and selected by the Cornell research staff.[3] The consultant is not permitted to perform the surgery should the patient decide to have the operation.

The consultant either confirms or does not confirm the recommendation for surgery. The former indicates that the consultant agrees that surgery should be performed. The latter is a result of one of two factors: 1) the diagnosis

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[1] Elective surgery is defined as operations or surgical procedures which are not considered to be emergency or life threatening and are subject to the choice or decision of the patient and physician. Specifically excluded are surgeries required as a result of trauma, normal vaginal deliveries, and elective abortions.

[2] The evaluation phase of the program has been funded by the Health Care Financing Administration since 1974.

[3] Consultants must be Board certified, must submit a resume to the Cornell research staff for review, and must comply with the rules of the program. They are paid $40 per consultation.

which would normally indicate surgery is incorrect, or 2) the diagnosis is correct, but medical treatment, not surgery, is warranted. The recommendation for medical treatment does not preclude the possibility of surgery being performed at a later time.

If the consultant suggests an alternative method of treatment or says surgery is not necessary, the individual is free to decide whether or not to have surgery. The second opinion helps assure the individual that the care he or she is receiving is warranted and appropriate. Even if the consultant suggests that surgery is not necessary or that the operation can be deferred, the patient is free to proceed with the surgery if he or she desires. The final decision always rests with the individual. A third opinion will be arranged should the patient make such a request. Benefits will be paid to those individuals in the mandatory program should the consultant not recommend surgery and the patient decides to have the operation (patient's prerogative).

Findings

Analysis of the data compiled from the inception of the program (February, 1972 through October, 1977) indicated that 27.9 percent of those participating in the second opinion program were not confirmed for elective surgery by the Board certified consultant. Table 1 shows that 33.5 percent within the voluntary group and 17.2 percent within the mandatory group were not confirmed.

Table 2 shows the distribution of those who were not confirmed for elective surgery, analyzed by the most frequently screened procedures. Within the voluntary group, almost half (47.8 percent) were not confirmed for surgery of the knee; 41.9 percent were not confirmed for a hysterectomy, and 40.3 percent were not confirmed for a prostatectomy. In the mandatory group, over one quarter (27.3 percent) were not confirmed for a hysterectomy; and roughly 23 percent were not confirmed for surgery of the knee and for a prostatectomy.

Table 3 shows the percentage of those not confirmed for elective surgery analyzed by surgical specialty.[4] Within the voluntary group, 45.3 percent were not confirmed for orthopedic conditions; 39.5 percent were not confirmed for gynecological conditions. Within the mandatory group, one third were not confirmed for orthopedic conditions and roughly 23 percent were not confirmed for gynecological and opthalmological conditions, respectively.

The following tables are based on information obtained from a telephone interview completed six months after the date of consultation. These figures are based on an 80 percent response rate. Table 4 shows that of those not confirmed for elective surgery, 82 percent had not had the surgery performed six months after their consultation with the second opinion consultant. Within the voluntary group, 84.1 percent who were not confirmed for elective surgery had not had the operation. Two thirds (68.2 percent) within the mandatory group had not had surgery. Preliminary data from the second follow up phase of our research (interviews completed one year from the date of consultation) indicated that of those not confirmed for surgery in the voluntary group, 79 percent reported no surgery at all. Within the mandatory group, 63.6 percent of those not confirmed for surgery have not had surgery.

The majority of those within the voluntary and mandatory groups who were not confirmed for surgery but who decided to have the operation did so because they reported that their condition deteriorated (82.5 percent and 62.2 percent, respectively). Second follow up results indicated that for the majority of the cases, if surgery was

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[4] Data are from February, 1972 through June, 1977.

Table 1
Participation in Elective Presurgical Screening Program, February, 1972 to October, 1977.

	Voluntary		Mandatory		Total	
	N	%	N	%	N	%
Not confirmed	1510	33.5	401	17.2	1911	27.9
Confirmed	3004	66.5	1933	82.8	4937	72.1
Total	4514	100.0	2334	100.0	6848	100.0

Table 2
First Follow Up Data: Individuals *Not Confirmed* for Surgery Analyzed by Most Frequently Screened Procedures, February, 1972 through October, 1977.

	Voluntary			Mandatory		
	Total	Not Confirmed		Total	Not Confirmed	
Procedure	N	N	%	N	N	%
Hysterectomy	503	211	41.9	161	44	27.3
Surgery of the heart	105	30	28.6	19	3	15.8
Cholecystectomy	181	22	12.2	102	11	10.8
Surgery on mass, cyst, lesions	679	195	28.7	410	61	14.9
Surgery on the breast	279	80	28.7	155	22	14.2
D and C	129	43	33.3	202	39	19.3
Cataract removal	186	56	30.1	100	19	19.0
Surgery of the knee	157	175	47.8	43	10	23.3
Prostatectomy	144	58	40.3	26	6	23.1

Table 3
Percent *Not Confirmed* for Elective Surgery According to Surgical Specialty, February, 1972 to June, 1977.

	Voluntary			Mandatory		
Specialty	Total N	Not Confirmed N	%	Total N	Not Confirmed N	%
General Surgery	1338	317	23.7	763	87	11.4
Gynecology	851	336	39.5	420	96	22.9
Orthopedics	664	301	45.3	147	49	33.3
Otolaryngology	472	130	27.5	228	39	17.1
Urology	309	104	33.7	97	15	15.5
Opthalmology	334	107	32.0	151	34	22.5
Cardiovascular	162	54	33.3	18	3	16.7
Other*	234	85	36.3	58	5	8.6

* Other includes Plastic surgery, neurosurgery, dermatological surgery.

Table 4
First Follow Up Data: Individuals *Not Confirmed* for Surgery Compared to Surgery Performed or Not Performed, February, 1972 to October, 1977.

	Voluntary		Mandatory		Total	
	N	%	N	%	N	%
Surgery performed	179	15.9	55	31.8	234	18.0
Surgery not performed	948	84.1	118	68.2	1066	82.0
Total	1127	100.0	173	100.0	1300	100.0

Table 5
First Follow Up Data: Individuals *Not Confirmed* for Surgery Who Have not had Surgery Performed Compared to Medical Treatment Status, February, 1972 to October, 1977.

	Surgery Not Performed					
	Voluntary		Mandatory		Total	
	N	%	N	%	N	%
Medical treatment	355	39.3	47	41.2	402	39.5
No medical treatment	548	60.7	67	58.8	615	60.5
Total	903	100.0	114	100.0	1017	100.0

performed, regardless of the consultant's recommendation, the procedure was scheduled within the first three months from the date of the consultation.

Table 5 shows that almost two-thirds (60.5 percent) who were not confirmed for surgery and who did not have the surgery performed reported receiving no medical treatment. An almost identical percentage within the voluntary and mandatory groups reported no medical treatment (60.7 percent and 58.8 percent, respectively). This group represents potential surplus surgery as well as some question about the original diagnosis. Continued follow up analysis will monitor how many of these individuals will defer surgery without jeopardizing their health.

Table 6 shows the distribution of those confirmed for elective surgery analyzed by surgical status. While the majority did have the surgery performed (71.9 percent), over one quarter (28.1 percent) had not had surgery six months from the date of the consultation. This patient-deferred surgery represents 30.2 percent of the voluntary group and 15.2 percent of the mandatory group.

Data from the second follow up showed that within the voluntary and mandatory groups, roughly one quarter of those who were confirmed reported no surgery a year after the date of their consultation. When these individuals were asked why surgery had not been scheduled, a plurality within both the voluntary and mandatory groups reported that they felt that the surgery could be postponed, 42.4 percent and 36.0 percent, respectively. Roughly one fifth within both groups reported that their symptoms improved or that the condition was tolerable.

Table 7 shows the distribution of those who were confirmed for surgery but who did not have the surgery performed, analyzed by the presence or absence of medical treatment. Two-thirds within the voluntary and mandatory groups reported receiving no medical treatment, 65.6 percent and 69.0 percent, respectively. From a public health standpoint, the denial of warranted and appropriate surgery is as disturbing as the performance of needless surgery. These individuals could incur disability and, in some cases, premature death as a result of the denial of medical and/or surgical care. This population at risk will be studied carefully to gain further insight into the correlates of patient-deferred surgery.

Table 6
First Follow Up Data: Individuals *Confirmed* for Surgery Compared to Surgery Performed or Not Performed, February, 1972 to October, 1977.

	Voluntary		Mandatory		Total	
	N	%	N	%	N	%
Surgery performed	810	69.8	162	84.8	972	71.9
Surgery not performed	351	30.2	29	15.2	380	28.1
Total	1161	100.0	191	100.0	1352	100.0

Table 7
First Follow Up Data: Individuals *Confirmed* for Surgery Who Have not had Surgery Performed Compared to Medical Treatment Status, February, 1972 to October, 1977.

	Surgery Not Performed					
	Voluntary		Mandatory		Total	
	N	%	N	%	N	%
Medical treatment	115	34.5	9	31.0	124	34.3
No medical treatment	218	65.5	20	69.0	238	65.7
Total	333	100.0	29	100.0	362	100.0

Discussion

The ability to screen potential surplus surgery assumes greater importance when national surgery rates are examined. Rates from the Hospital Discharge Survey show a dramatic increase in surgical rates since 1971. (National Center For Health Statistics)

Indeed, in the 1970's the annual escalation in the rate of surgery grew three and one half times faster than the population. While the annual rate of increase in the population was 0.8 percent from 1971 to 1975, the annual rate of surgery grew from 7,805 per 100,000 population in 1971 to 8,951 per 100,000 in 1973, and to 9,585 per 100,000 in 1975. It is estimated that the number of surgical procedures will have exceeded 21 million by 1976. (Rice, 1977)

Many possible explanations have been offered to explain this increase. It has been suggested that there may be too many surgeons for the needs of the population and that this situation may lead to excessive surgery being performed (Nickerson, 1976). Other studies also support the hypothesis that surgical rates are related to the supply of surgeons (Lewis, 1969; Wennberg and Gitlelsohn, 1973, 1975). What seems to be most plausible is that many factors interact to reinforce the situation.

While the full impact of the second opinion program is not yet known, the data to date indicate the ability of the program to screen potential surplus surgery. Second, third and fourth follow up evaluations will monitor those individuals who continue to defer surgery. Moreover, the follow up phase will also provide more information on the population at risk (confirmed, no surgery cohort).

The second opinion elective surgery program also should be viewed as one means of possibly curtailing the increase in rates and cost. While an intensive two-year economic study is now in progress to calculate both the direct and indirect costs of the second opinion program, the Cornell second opinion program already has had an impact on some of the security welfare plans' costs. The Municipal Building Service Welfare Fund (Local 32B - 100,000 insured), for example, reported a 14.3 percent reduction in in-hospital surgical claims from October 1, 1975 through September 30, 1976. This reduction represented an approximate savings of $1 million.

The principal benefit of the second opinion program has been realized by the Sentinel Effect. As the existence of the program becomes known, a dramatic drop in the rate of in-hospital surgical claims has been observed. For example, the United Storeworkers' mandatory second opinion program (18,000 insured), available for union members working at Gimbels-Sterns and Bloomingdale's department stores, showed a nine percent decrease in surgical claims in a before and after study (1971–72 and 1974–75). Another example of this phenomenon was noted in Saskatchewan. The rate of hysterectomies dropped 60 percent over a four-year period after a monitoring program of retrospective case review was instituted (Dyck, 1977).

Conclusion

While the physician's recommendation for surgery should be based on his or her consideration of the advantages and disadvantages of such a course of treatment, it is ultimately up to the patient to decide whether to have the operation or not. Indeed, ways of improving the quality of health care and of reducing costs are not exclusively restricted to the providers of medical care. Consumers can, and should, take an active, informed part in caring for their health and well-being. The objective of the second opinion program is to help the individual recommended for elective surgery make a more informed decision.

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Questions and Answers

Question: I wanted to make sure I understood what base those percentages are measured against. Is it all people who presented themselves for consultation or is it against the base of those who are confirmed?

Gene McCarthy: The base is those who presented themselves for a consultation.

Question: Do the consultations include some initial referrals? The family doctor may have said, "I think you need an operation, see a surgeon". Then will you pay to have him see the surgeon and count that as one of these consultations?

Gene McCarthy: That's right.

Question: In the short written summary you said something about SSA funding coming at a certain point. The initial impression I got was that the funds may have included some patient care money, but I now suspect that isn't true. It's just the money to pay for all this tracking operation.

Gene McCarthy: All of the patient care money and all of the operations of the second opinion program in our 14 Taft Hartley funds, which run into hundreds of thousands of dollars, have been funded from those Taft Hartley funds. There was no government money at all.

Question: If the procedure recommended by the second physician is different from the one proposed by the first physician, does that tend to further hesitation on the part of the patient? In a number of conditions, there's more than one approach or different degrees of extensiveness of the exploration. Secondly, I think there might be surgeons of consultants who give their opinion with a greater sense of urgency: i.e., "This is absolutely essential and must be done without a moment's delay."

Gene McCarthy: In responding to our study, the AMA indicated that we now have a phenomenon called comfort surgery and that the rise in surgical rates are really the responsibility of the patients. We are going to look and see if there was a rise in the prepayment groups around the country across the same time frames of 1971 to 1976. Perhaps there was some economic "incentive." We'd be very interested to find whether there has been an explosion in surgical preferences on the part of the individuals. We have found that individuals will go to great lengths not to have surgery, but we don't find a large population of individuals who are seeking surgical care.

Comment: One area in Vermont that adopted a second opinion program had two factors relevant to this discussion. One was that it paired a surgeon and a pediatrician. This combination seemed to get a lot more controversy than pairing two surgeons, with regard to tonsillectomies. The rate dropped to nine percent of its original one. This kind of explicit dialogue between different points of view can bring about some remarkable changes. Second, the doctors in that area were afraid that if they stopped providing particular treatments, patients might try to get treatment elsewhere. That didn't occur.

Question: Why have you not used a non-surgeon as a second opinion, particularly when the issue is controversial about whether it should be treated medically or surgically?

Gene McCarthy: We would obviously love to have the opportunity to see the differential in these terms. We were helpful in starting the second opinion program for Chrysler, Ford, and General Motors. However, we talked about this program for 36 months before it saw the light of day. One of the major hidden factors was the medical politics of the situation in the greater Detroit area. The program initially announced it would give the insured the opportunity to select either a surgeon or an internist in the appropriate specialty. This was quietly boycotted by the surgeons in the area so that no panel was formed. To be quite candid with you, the only way the boycott was broken was to drop this as a proviso. We were concerned that if the second opinion consultant were not a surgeon, the patient might question the value of the judgment of that doctor. That is not documented. It is purely a supposition on our part.

An Epidemiologic Perspective on the Problem of Supplier-Induced Demand: The Case of Surgery and Surgical Second Opinions

by John Wennberg, Benjamin Barnes, and Michael Zubkoff

Introduction

This paper discusses the puzzling problem of large differences in per capita use of medical services, particularly among populations which by all available measures appear quite similar. Particular attention is paid to variations in rates of common surgical procedures such as prostatectomies, tonsillectomies, and hysterectomies. The differences in rates have important implications for costs and for population exposure to iatrogenic risks. The possible cause of the differences in per capita rates and the impact second surgical opinion programs have on the rates are also discussed. To do this properly, it is not possible to avoid an ongoing controversy in another discipline, the controversy concerning the nature and extent of supplier influence on the demand for medical services.

In any inquiry into economic behavior, the point of departure is the succinct principle of supply, demand, and consumer sovereignty. But in applying the principle to health care markets, some economists feel that one foundation of consumer sovereignty—the assumption of rational consumer choice—is in jeopardy. In the case of spending decisions, it is customary to assume that: (1) consumers know what they want; (2) consumers know the effectiveness of various goods and services in attaining what they want; (3) consumers know the price at which goods or services can be obtained; (4) each consumer uses this information to maximize his or her total satisfaction. However, these assumptions cannot be valid in the information-poor market for health services, because consumers face considerable uncertainty in defining wants (and needs). Further, they cannot discern the value of various procedures and services in meeting needs or weigh issues of utility in the usual fashion and thus cannot buy at the lowest price. In this peculiar market the seller, or the physician, is also the agent for the buyer. He or she defines needs, evaluates therapy and prices, and makes vicarious utility judgments for the patient. In medicine these utilities are very largely determined by the physician in contrast to the active role the client plays in most other areas from architecture to law. Arrow (1963) emphasizes the particular and rational nature of the delegation of the decision-making to the physician who recognizes health needs and understands the value of alternative therapies. By controlling information, the physician plays the role of an agency and is in a position to manipulate demand. To control self-serving behavior non-market factors such as professional ethics, peer attitudes, and governmental regulations help maintain the quality of patient care. As exemplified by the Professional Standards Review Program, it is reasonable for Government to require the medical profession to establish standards which reflect the consensus of the profession on the best way of treating patients. These guidelines, the assumption goes, will serve to weed out deviant, inefficient professional behavior.

The viewpoint that suppliers can influence demand is not universal (Sloan and Feldman, 1977; Pauly, 1974; Evans et al., 1978; Reinhardt, 1977; Evans and Wolfson, 1978). Sloan, for example, counters this argument by asserting that standard theory does not require that everyone have perfect information—only that a "significant number of marginal consumers (are) able to assess output and (be) willing to seek it out at its lowest price (Sloan and Feldman, 1977)." To make the point, he quotes Pauly: "I know even less about the works of a movie camera than I

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know about my own organs; yet I feel fairly confident in purchasing a camera for a given price as long as I know that there are at least a few experts in the market who are keeping the sellers reasonably honest (Pauly, 1974)." One regulatory approach consistent with this strategy is the Surgical Second Opinion Program which offers the consumer the opportunity to obtain an evaluation of the recommendation for surgery from an independent expert. The physicians who give second opinions presumably assume a "pure" agency role for the patient since they are excluded from the seller role—they may not operate upon or otherwise treat the patient seeking their opinion.

The rationale of the delegated decision as formulated by Arrow or the opportunity to find experts who confide rational advice under Pauly's strategy depends on the possibilities for substantial rationale among physicians in their decision-making role as clinicians. In a market characterized by delegated decision-making, whether through seller-agents or the independent expert-agents, the assumptions for rational agent behavior are analogous to the requisites for rational consumer choice in the classical market situation. For physicians, the principles for rational agency choice may be summarized:

1. Physicians know the effectiveness of various goods and services on health status for various human conditions.
2. Physicians diagnose what their patients need and in the individual situation allocate technology and care based on knowledge about the possible outcome.
3. As a profession, physicians use the information to maximize the patient's utility.
4. Physicians can identify the methods for providing care which cost least and purchase care for their patients at the most efficient price.

Unfortunately, these assumptions may not be valid. Both sides of the controversy may have misunderstood the nature of physician behavior in the clinical setting by underestimating the market implications of physician (as opposed to consumer) uncertainty in diagnosing disease and prescribing appropriate treatment. The uncertainty stems in part from problems in classifying the patient's disease, the extent of disease, and the value of the treatment. Uncertainty also stems from the more fundamental fact that adequate information on the probabilities for treatment outcomes under controlled circumstances commonly does not exist. Finally, uncertainty exists even when patients are appropriately classified and outcome probabilities are known; the utility of the physician—who makes the vicarious decisions—may not correspond to the patient's utility (McNeil, Weichselbaum, and Parker, 1978). Thus the problem of "demand shift"—the rate at which demand for specific procedures such as prostatectomies and tonsillectomies, varies among communities—is more accurately understood when it is characterized as a problem illustrating the impact on consumption rates of physicians' differing beliefs rather than as an example of self-serving professional response to economic incentives. To put the problem back in Pauly's terms of reference, the complexity of human biology and human decision-making in the clinical setting means that, on net, information on the workings and repair of a camera is more thorough and reliable than is information on the workings of organs and their appropriate repair.

Epidemiologic studies in New England lead to the point of view that in the real world the assumptions for rational behavior are often not met and the attributes of professional behavior implied by these assumptions are inefficient regulators of the demand for care. The importance of this may be illustrated by a brief look at one of the current regulatory initiatives of the Federal Government—the Second Surgical Opinion Program.

The General Problem of Variation in Demand

Epidemiologists are interested in the measurement and distribution of medical events as they occur in defined populations. It has been apparent for some time that the use of medical services and expenditures varies significantly among apparently comparable populations living in neighboring communities. The characteristics of these variations are incompatible with theories of rational decision-making either by consumers or providers. The extensive evidence predates, the widespread availability of health insurance in the United States, or of national health insurance in the United Kingdom. The classic description of small-area variations is Glover's pre-World War II study of tonsillectomy among British school children in which tenfold differences existed in per capita rates between different school districts (Glover, 1938). These variations in demand for tonsillectomies persisted long after national health insurance removed any possible economic motives for tonsillectomy. In 1959, the Chief Medical Officer noted in his annual report that "the tonsillectomy rate ranges from 0.5 percent in Merthyr Tydfil to 16.3 percent in Chester; in those aged 15 years, it ranges from 1.3 percent in Swansea to 36.5 percent in Kington-upon-Hull (Glover, 1959)." In more recent years extensive variations for total surgery and for specific procedures have been documented for neighboring communities within the United States (Wennberg and Gittelsohn, 1973), (Bunker, 1970), Canadian Provinces (Vayda and Anderson, 1965; Roos, Roos, and Henteleff, 1977), geographically separated but apparently homogeneous members of insurance plans (Lewis, 1969), and enrollees in prepaid group practices (Luft, 1978). While the rates are generally lower in the United Kingdom than in North America, the range of variation within the United Kingdom appears to be of the same order of magnitude as seen among North American areas under prepaid group practices contrasted with fee-for-service arrangements in the United States (McPherson, Wennberg, and Havino, 1980).

Variations in demand for surgery may occur because of four independent sets of factors that are intrinsic to the populations or to the suppliers of health care. For a population, the probability of surgery of a particular type (S_K) for a particular disease (h) can be expressed as a function of the conditional probabilities of the four independent factors:

p_{hi}	Probability of Disease h in Individual i
q_{ij}	Probability Individual i seeks care from Physician j
$r_{jk(h)}$	Probability Physician j uses Condition Label k for Disease h
$s_{jk(h)}$	Probability Physician j recommends surgery for Condition k(h)

The probability S_K for a particular procedure in the population may be represented as the sum over all disease states h (including pseudo h), of individuals i (who are members of the population) and physicians j (who are contacted by one or more members of the population):

$$S_K = \Sigma_h \Sigma_i \Sigma_j p_{hi} q_{ij} r_{jk}(_h) s_{jk}(_h)$$

Further, the overall rate of surgery in an area (S_t) is a function of the individual probabilities associated with each of the constituent procedures that are part of current surgical practices:

$$S_t = \sum_1^n S_{K_1} + S_{K_2} + S_{K_3} + \ldots + S_{K_n}$$

This model summarizes both biological and social factors which determine surgical demand, (S_t and, individually, S_K).

Consumer contributions to market variations in demand are associated with factors that determine the disease incidence in populations and those which affect the behavior of individuals in making choices to seek and to consume care. The null hypothesis states that when these conditional probabilities are the same between populations, the rates of surgery will be the same if the physicians who treat the populations are similar.

Direct evidence that consumer factors meet the null hypothesis condition has been obtained for selected communities in Vermont (Wennberg and Fowler, 1977). Approximately 300 households were surveyed in each of six hospital service areas selected for study because of differences in size and in rate of consumption of health services. These areas have a range in use that is nearly two-fold for surgery rates and per capita expenditures for hospital care. The household survey detected few differences among the populations in the distribution of consumer attributes that are usually thought to predict the use of health services. No differences were seen in the distribution among areas for such important predictors of use of care as the proportion of consumers with health insurance (cross-classified by type of insurance coverage), reported episodes of acute and chronic illness, poverty level, or availability of physician care. Further, residents of the surveyed areas contacted their physicians in approximately equal proportions (75%) on an annual basis. The results indicate that these populations, while differing with regard to exposure to medical services and rates of use were essentially similar with regard to age specific illness rates, and behavior of consumers in seeking care.

Physician contributions to market variations in demand are suggested by several studies which show that the composition and overall cost of health services vary depending upon the number, type of specialty, and other characteristics of physicians serving the populations. Feldstein (1971) has shown an inverse correlation between numbers of general practitioners and use of hospitals; Bunker's studies show that the difference in surgery rates between the United Kingdom and the United States is associated with a difference in per capita numbers of surgeons (Bunker, 1977); a similar relationship has been shown by Vayda and Andersen for Canadian Provinces (Vayda and Andersen, 1968) and Lewis for counties in Kansas (Lewis, 1969) and for U.S. census areas by Fuchs (Fuchs, 1978). The SOSSUS studies show a similar relationship (American College of Surgeons and American Surgical Society, 1976).

Wennberg and Gittelsohn show that demographically similar populations living in Vermont[1] hospital service areas served by more general practitioners who do not perform surgery, have lower per capita costs for hospitalizations and fewer surgical admissions than areas served by general practitioners who perform surgery. This finding is consistent with that of Feldstein cited above. Further, areas served by general practitioners who do not do surgery have lower expenditures for diagnostic services. Patients in areas with more internists incur greater costs for hospitalizations and receive more diagnostic tests; patients in areas with more surgeons receive more surgery (Wennberg et al., 1976).

The current status of investigations into the association between relative supplies of specialists and relative demand for services is summarized in Table 1 (Wennberg et al., 1978).

The correlations between physician supply and expenditures and service rates derive, of course, from differences in workload undertaken by the individual physicians who make up the different specialties. Generally, this workload cannot be related to indicators of the relative need of one population when compared to another (Wennberg et al., 1973). Further, differences in total expenditures tend to relate to volume rather than pricing differences. For example, in the case of relative supply of internists, the positive correlation between laboratory and electrocardiogram expenditures stems from the internist's inclination to perform the test rather than from greater charges or reimbursements. The reverse situation pertains to general practitioners (Table 2).

Although this paper concentrates on surgical practices, studies of the epidemiology of common medical practices in New England show consistently *larger variations in hospital use rates for non-surgical cases than for surgical cases.* In addition the observed variations in use rates for diagnostic procedures are substantially larger than for most surgical procedures. Consequently, surgical use rate variations may be considered a conservative estimate of the extent of medical practice variability.

Supplier Induced Demand Exemplified by the Case of Surgery

Cross-Sectional Variations in Demand

Investigation of the epidemiology of specific procedures at the small area level of population aggregation provides insight into the nature and importance of professional influence on demand. This method is particularly valuable for demonstrating differences on the supply side of the utilization model. In a typical small area analysis, the numbers of common procedures occurring in the study populations are sufficiently large to obtain statistically "stable" rates; the number of physicians whose workloads contribute to each area rate, however, is small. The aggregate rate of an area is thus the weighted average of the decisions made by a small sample of physicians regarding indications for the procedure. When communities

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[1] Six of the 13 areas were selected for the surgery reported above.

Table 1
Expected Association Between Quantity of Physicians and Quantity of Medical Services (Units Per Capita)

		Type of Supplier				
Type of Service	Internist	General practitioner doesn't do surgery	General practitioner does do surgery	General surgeon	Obstetrician gynecologist	Rationale
Access to care for new episode of illness°	–	+	+	?	?	Internists tend to have smaller patient panels with more scheduled re-visits and greater intensity of service per visit. General practitioners have more open schedules with larger panels and easier access for acute episodes of care. General surgeons tend to do less diagnostic workups and have fewer re-visits.
Ambulatory care:						
visits°*	+	–	–	–	?	
cost*	+	–	–	–	+	
diagnostic test*	+	–	–	–	+	
x-rays*	+	–	–	–	?	
Hospitalization:						Non-surgeon general practitioners use ambulatory modalities more, and when they do admit, apply less technology per case. Internists effect cost mainly because of intensity of care; they may decrease LOS slightly. Surgeons do surgery and fewer diagnostic tests. Obstetrician-gynecologists increase surgery for both OB (C-sections) and GYN. They increase costs per case for delivery and do more GYN per capita.
medical admission*@	?	–	+	+	+	
length of stay*@	–	?	?	–	–	
costs*	+	–	+	+	+	
diagnostic tests*	+	–	–	–	+	
x-rays*	+	–	–	–	+	
surgical admissions*@	–	–	+	+	+	

Source of information
° = Household Survey
* = Medicare Part A or B
@ = Hospital Discharge Abstract

Source: J. Wennberg, M. Zubkoff, & A. Gittelsohn; A Systematic Study of the Nature, Extent, Causes, & Cost Implications of Small Area Variations in Hospital & Ambulatory Care; Grant—18-P-97192/L-01 from Health Care Financing Administration, HEW 1978

Table 2
Average Reimbursement per Service, and Number and Average Reimbursement per Office Encounter by Type of Physician and Service (Vermont, 1972)

	General Practitioner	Internist	Internist with Subspecialty
Average reimbursement per service			
Basic visit	$ 5.96	$ 7.50	$ 7.67
X-Ray	13.62	15.20	13.71
Lab tests	2.94	2.86	3.60
EKG's	13.88	13.96	13.58
Number of services per 100 encounters			
X-Ray	1.9	4.5	2.8
Lab tests	16.0	37.9	44.4
EKG's	1.9	10.8	9.1
Average reimbursements per encounter			
Basic visit	$ 5.96	$ 7.50	$ 7.67
X-Ray	.26	.69	.39
Lab tests	.47	1.08	1.60
EKG'S	.26	1.49	1.23
All services	7.35	11.06	11.49

Wennberg, J. and A. Gittlesohn; Towards An Epidemiology of Common Medical Practices, Submitted as a final report for a National Center for Health Services Research Contract HRA 600-77-0039

with similar populations are compared, the patterns of variation will reflect the range of physician choice concerning the labeling and belief characteristics summarized in the model. While the pattern is inevitably an understatement of the true range of professional differences (because the rates are weighted averages), comparisons of the pattern of variation can yield insights into the nature and consequences of differences among physicians in clinical decision-making.

One source for the suggestion that decision rules[2] differ substantially among surgeons in regard to how operations ought to be distributed is the repeated observations in Vermont, Maine and Rhode Island of the phenomena depicted in Figure 1. Figure 1 is derived from studies of rates of surgery in hospital service areas in Maine. The numbers on each bar are the ratio of the rate in that area to the State rate. The figure gives data for the five largest hospital service areas in Maine. The expected number is the age-corrected number of cases that would occur in each area if the State average rate applied. The figure shows that the rates at which specific procedures are performed within an area vary markedly and to a large degree vary independently of the total operation rate. For example, while Area II and Area III have the same total operation rate, Area II exceeds the hysterectomies (56 percent more than the State average) and Area III exceeds in varicose veins (89 percent more than the State average). In contrast, the hysterectomy rate in Area III is well below the State average and approximately one-third the rate in Area II. In each of the five areas a different procedure is performed most often. In four of the five areas, the least performed procedure is different. The number of surgeons and their specialty distribution do not vary to the same degree as the population-based rates for these operations. Also hospital beds per capita do not vary in a pattern to account for the variation in rates. Consequently, physician and resource supply are a less likely explanation than differences in opinions of physicians about the proper reasons for surgery.

A second source of evidence of the importance of physician decision-making as a major factor in small area variations is the discovery that specific surgical procedures have characteristic patterns of variation. Figure 2 demonstrates this point with population-based rates of operations comparing the coefficient of variation and the

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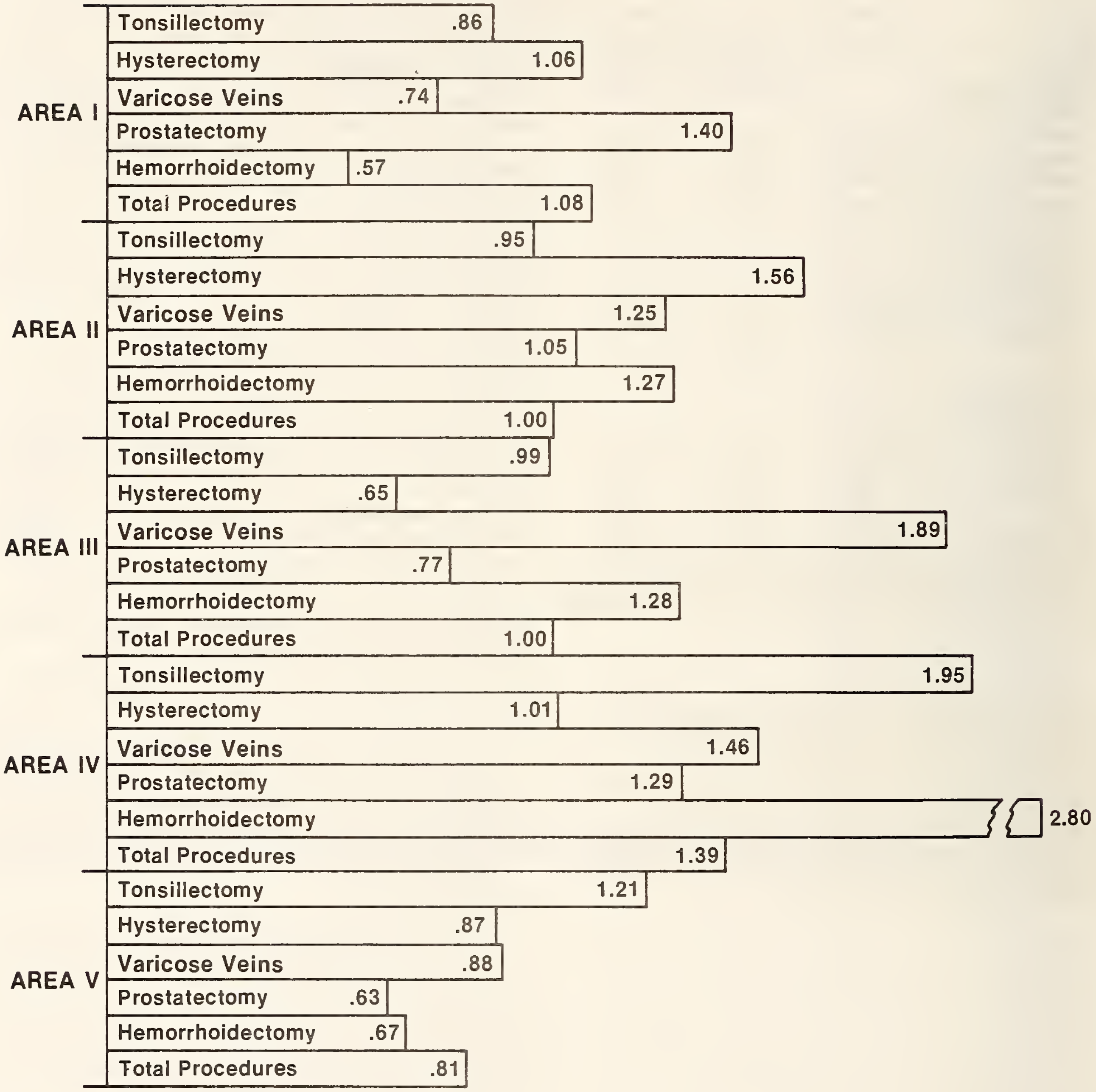
[2] The evidence for the absence of a central professional consensus on the diagnosis of many illnesses and on the value of many treatments is independent of our observations in variations. The medical literature is clear concerning the ambiguous nature of the evidence purported to connect many commonly used medical practices and improved health (Bunker, 1977). It is also clear concerning the variability of physicians as observers and interpreters of medical evidence (Koran, 1975).

The existence of variations or disagreements among physicians in recommending surgery is also not a newly documented phenomenon. While Bernard Shaw may have been the first to make the case for a second opinion, convincing evidence of the importance of variations in physician perceptions of medical need is the 1934 study of the American Health Association. In a sample of 1,000 New York school children, 60 percent had tonsillectomies. The remaining 40 percent were re-examined by school physicians who selected 45 percent for tonsillectomy; the children without recommendation were then re-examined by a second group of physicians who recommended that 46 percent undergo the procedure. The third re-examination of twice rejected children led to tonsillectomy recommendations in 44 percent. After three successive "second opinions" only 67 out of the original cohort of 1,000 were spared a recommendation for tonsillectomy. The author concluded that the process of recommendation depended principally on the physician rather than on the child's health status.

Figure 1
Pattern of Variation for Selected Common Procedures
in Five Maine Hospital Service Areas (1973)

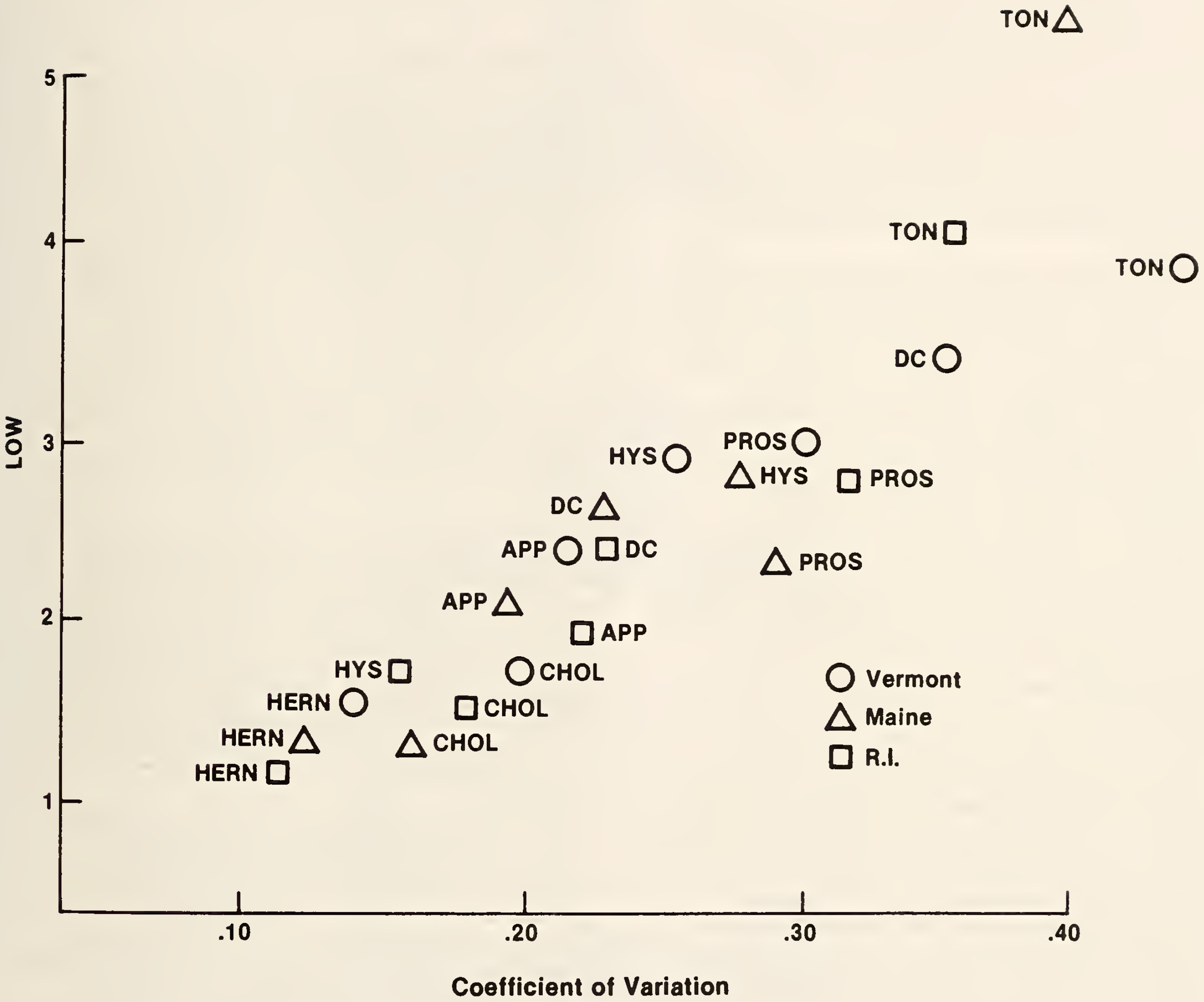


For explanation, see text.

Source: Wennberg, J.F. and A. Gittelsohn: Health Care Delivery in Maine, I: Patterns of Use of Common Surgical Procedures, Journal of the Maine Medical Association, 66:123-130 and 149, 1975.

Figure 2

Pattern of Variation
Selected Common Surgical Procedures



For explanation, see text.
Source: Codman I Report

range of difference between high and low rate areas for eleven hospital service areas in Maine, Vermont, and Rhode Island. Hernia procedures (inguinal herniorrhaphy) have a similar "low level" pattern of variation in all three states; appendectomy and cholecystectomy have intermediate levels of variation; prostatectomy, dilatation and curettage, and tonsillectomy are examples of high order variation procedures that appear to have similar patterns of distribution in each State.

A third related source of evidence is the systematic test of the model in the equation presented earlier. The null hypothesis states that *if* (in a given cross-sectional comparison) each of the conditional probabilities in the equations are the same between areas, then the distribution of observed rates will be normal. This follows from the normal law of errors which states that multiple independent sources of variations (based on random error) combine to generate normal distribution curves. Common surgical procedures that affect children are compared in Figure 3.

Hernia procedures in children come very close to fitting the null hypothesis: across 62 individual hospital service areas in Vermont, Maine and Rhode Island, the distribution of rates very nearly fits the distribution predicted by the null hypothesis. Ethnically, economically, and socially, these 62 areas must demonstrate considerable heterogeneity regarding the population at risk. There is also considerable variation concerning the distribution of facilities, physician manpower, and expenditures for medical services. Yet, in terms of the statistical parameters of the model, these differences are insufficient to generate measurable variations in incidence of professional processing of cases as reflected in the rates at which services are used. For this procedure, the null hypothesis tends to be valid.

Appendectomy rates are more heterogeneous, indicating that the conditions for the null hypothesis are not met. In contrast to both pediatric hernia and appendectomy, tonsillectomy demonstrates a gross departure from the requirements of the null hypothesis. Rates vary among areas by amounts which are both large and highly significant. The probability of a population undergoing various surgical procedures that show mid or high order variations has been estimated. For example, in Vermont (1969–1971), the probability of a tonsillectomy ranged from 8 to 62 percent of resident children. The probability of loss of uterus ranged from 24 to 52 percent and the probability of an appendectomy ranged from 11 to 31 percent.

The interpretation that variations reflect differences in professional judgments is supported by medical literature. In contrast to hernias in the elderly where a truss is sometimes recommended, for inguinal hernias among children there is no professionally recognized alternative treatment if the child is otherwise normal. The condition is noted for its transparency; the observation of the abnormality is usually made by a family member and the subsequent professional diagnosis presents no great difficulty. For appendicitis, there is nearly unanimous agreement that its proper treatment is surgery.[3] However, the physician must know when the condition is truly appendicitis and not some other illness for which an appendectomy is of no value. The data suggest that physician judgments to distinguish false positive and false negative situations are made differently from area to area. Tonsillectomy represents a procedure where there is uncertainty concerning the presence of the condition(s) requiring treatment (Bunker et al., 1977, American Child Health Association 1934). There is also intense differences in opinion among physicians concerning the value of the procedure for the condition. It is impossible to review the literature on this subject without obtaining insight into the problem of professional uncertainty concerning the value of common medical practices (DeDombal et al., 1972).

Trends and Constancies in Surgery over Time

Although changes in procedure rates occur, constancy is more common within a community. Thus, the phenomena illustrated in Figure 1 tend to persist over time, and it is possible to identify epidemiological "signatures" for the medical care consumed by a community which tend to be constant from year to year. Figure 4 illustrates such a "signature", giving the ratio of the observed to the expected number of cases for each of the five illustrated procedures in Area I. Note that the ratios remain nearly constant from year to year. In 1973 prostatectomies exceeded the state average in that area by a factor of about 1.4; over the next three years, the same pattern of excess for this procedure was observed. On the other hand, hemorrhoidectomy, a procedure that was done at a rate of only about 50 percent of the state average in 1973, continued through 1976 at about the same relative (low) rate. The other procedures maintained their characteristic places.

For the procedures illustrated in Figure 1, the number of cases in excess or deficit of that predicted by the state average can be large. Table 3 gives the accumulated observed and expected number of cases for each of the five areas over the four-year period. Area I records 736 fewer tonsillectomies and 349 more prostatectomies than predicted; Area II records 815 more hysterectomies; Area III records relatively fewer hysterectomies; Area IV excels in tonsillectomies (806 more than expected) and in hemorrhoidectomies (152 more than expected); and Area V records 659 more tonsillectomies and 228 fewer hysterectomies.

It should be remembered that the small area technique displays the population impact of the clinical decisions made by a small number of physicians. For example, the hysterectomy profile in Area II is generated largely by six physicians who, from year to year, do about the same number of hysterectomies. Similar patterns of behavior exist for other physician-procedure combinations. Although not with clear exceptions, a constancy rule applies to workload decisions by physicians (Table 3 and Figure 4).

Change, however, does occur; sometimes the pattern may be seen through most areas, other times it occurs only in specific areas. The latter is more common and is usually related to migration of specific physicians. When change is nearly ubiquitous across areas it will relate to changes in professional perspectives concerning specific technologies. For example, the rapid rate of increase in cesarean sections follow recent changes in obstetrical instrumentation and philosophy. Tonsillectomy is an example of a technology "going out of vogue"; it showed a rapid decline in many New England hospital service areas.

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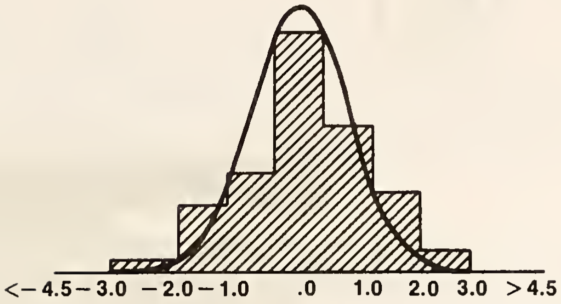
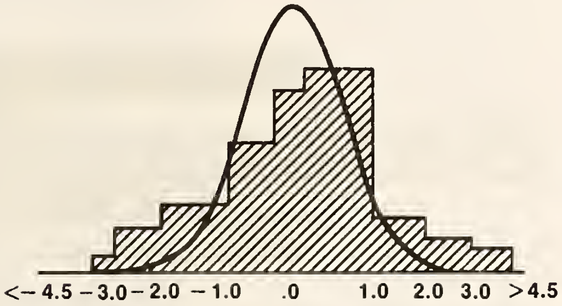
[3] However, a recent editorial in *The Lancet* called for a randomized trial of antibiotic treatment for some forms of appendicitis. The presence of professional agreement does not require rigorous information on end results.

Figure 3
Histograms of Z Score Distributions

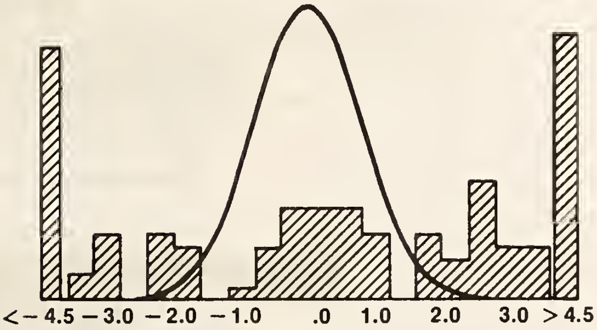
Pediatric Inguinal Hernias



Pediatric Appendectomies



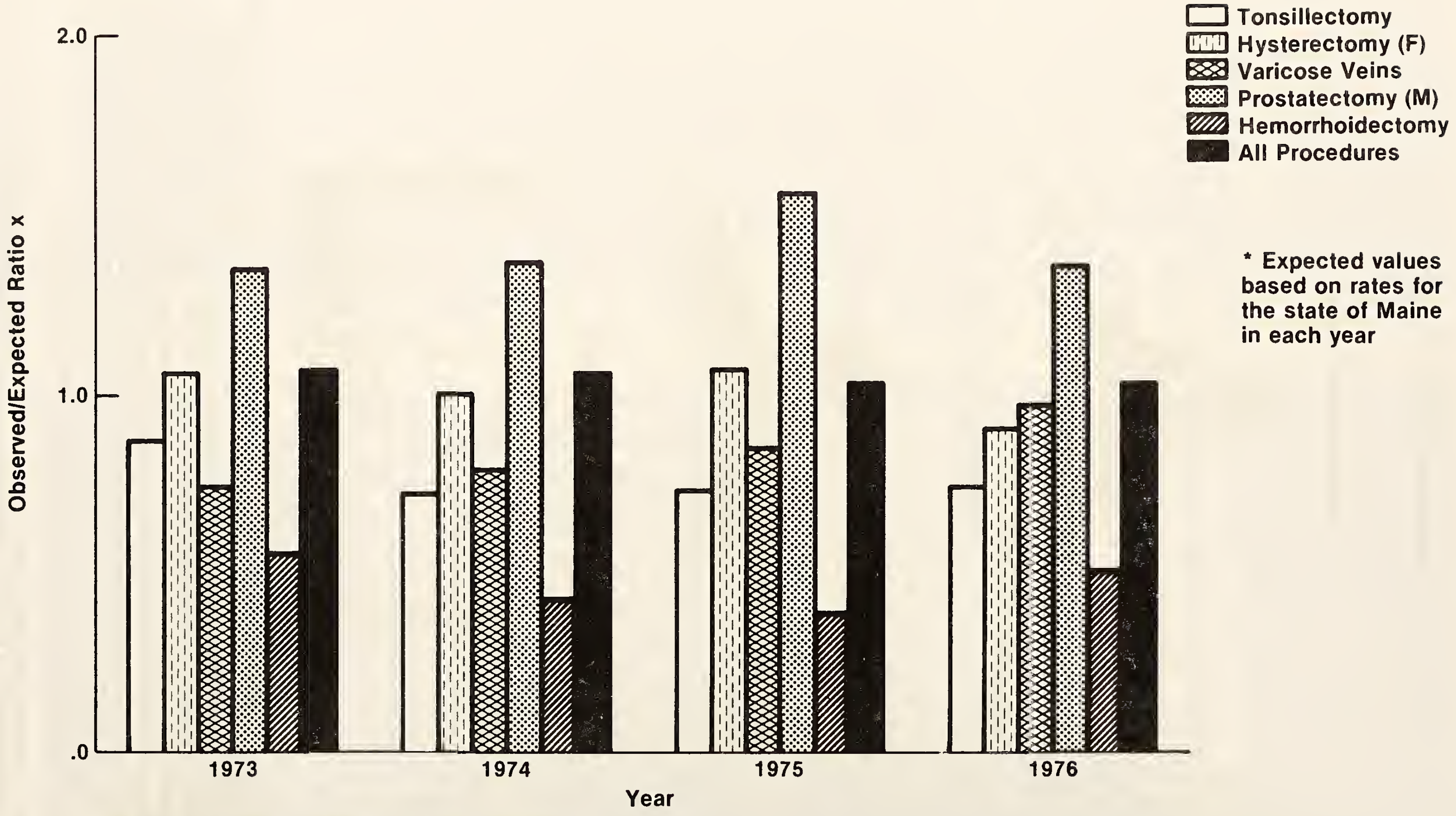
Tonsillectomies



This figure is a histogram of the distribution of Z scores based on one degree of freedom Chi-Square tests in which each rate in each of the 62 areas was tested against the rate for all areas. Under circumstances where the variation in rates among areas are explained by stochastic (or random) variation, the Z scores would approximate the normal distribution (mean = zero, standard deviation = ± 1). Such a distribution is expected if the null hypothesis holds: the incident of illness, access to physicians, physician labeling, and physician choice of therapy are similar among areas. For pediatric hernia the null hypothesis is approximated: most rates yield Z scores that fit the normal distribution as expected. For appendectomy, there is greater departure indicating that some or all of the conditions for the null hypothesis do not exist. For tonsillectomy, the rates are very different and the distribution is clearly heterogenous with regard to that predicted by the null hypothesis.

Source: J. Wennberg, M. Zubkoff, and A. Gittelsohn; A Systematic Study of the Nature, Extent, Causes, and Cost Implications of Small Area Variations in Hospital and Ambulatory Care.

Figure 4
Annual Pattern of Variation for Selected Common Procedures
in Hospital Service Area 1 in Maine



* Expected values
based on rates for
the state of Maine
in each year

Source: Codman Research Group Progress

Table 3
Number of Procedures Above (+) or Below (−) Expected* in Five Maine Hospital Service Areas For Selected Surgical Procedures 1973–1976

Procedure	Area I	Area II	Area III	Area IV	Area V
Tonsillectomy	−736	+ 97	+ 49	+806	+659
Hysterectomy	+ 15	+815	−140	− 62	−228
Prostatectomy	+349	− 14	− 54	+ 2	− 83
Hemorrhoidectomy	−223	+ 79	+ 79	+152	− 58

*Expected based on accumulated numbers of cases for each year, 1973–1976. State average rate is used to estimate the expected number of cases.

Source: Codman Research Group Progress Report #6, HRA Contract #291-76-0003, October, 1978.

Implications for Resource Use

Of course, the various patterns of common surgical procedures have different implications for resource use. The numbers of hysterectomies in Area II exceeds the expected (based on the state average) by 815. Assuming a total expenditure of 2,000 dollars per hysterectomy, the "overspending" for this population (of about 90,000 persons) for hysterectomies is well over 1.5 million dollars for the four-year period. By contrast, Area II (with comparable population size) "under-spends" by about .5 million dollars. Estimates have been made of the immediate differences in costs associated with the low and with the high strategy of nine common surgical procedures based on 1973 patterns of variation among the 13 largest hospital service areas in Maine. If extended to the United States, the high-use strategy would result in an annual expenditure of 6.3 billion dollars; the low-use strategy, would result in 2.5 billion dollars of expenditures. The dollar difference for these nine procedures alone is $3.8 billion or about 10 percent of the 1973 national investment in hospital care. This amount is greater than the total biomedical research budget of the United States Federal Government in that year.

What these data make apparent is that under existing market circumstances, professional decision-making varies substantially in the determination of "need". A clear implication is that substantially more surgical work can be done in any market without exceeding patterns of resource allocation considered appropriate by some physicians. Thus in the patient-agency role, physician behavior is capable of very different outcomes, given the current state of the art concerning knowledge of end-results and the methods professionals use for making clinical decisions.

Supplier-Induced Demand, and Federal Regulatory Initiatives: The "Second Opinion" Example

The phenomenon of geographic variations has been associated with intense interest in the possibilities for "unnecessary" surgery and its regulation which have in turn generated Federal interest in the value of a second surgical opinion as a means for controlling the marginal use of surgical procedures in the United States. Second opinion programs are characterized as "mandatory" or "voluntary". Under the mandatory model, all candidates for a specific procedure are required to obtain an opinion from a second surgeon, who must disqualify him or herself from performing the surgery. By these means the threat of the second surgeon "capturing" the patient is avoided, and economic incentives are eliminated as a factor in the second opinion. Assurance that the decisions themselves are consistent with the "state of the art" is pure process: The program insists that the second opinion expert be a qualified surgeon. Under voluntary programs sponsored by health insurance plans, participants are not required to have second opinions. However, the sponsor does advise them that surgery "may not always be indicated" and that they should consider obtaining a second opinion prior to their decision to accept any recommended surgery. Once the candidate makes a decision to seek a second opinion, he or she enters a similar decision tree as outlined for the surgical candidate in the mandatory program.

Both the voluntary and the mandatory programs are viewed as lowering risks for the public and as reducing costs for the government or other insurers. The theory is that, through a second opinion, physicians who would otherwise perform unnecessary surgery are prevented from doing so, because of the effect of a second opinion not supporting the recommendation for surgery or because of the "sentinel effect" phenomenon. In the latter case, the mechanism that acts to reduce the rate at which a physician identifies candidates is apparently the inconvenience or distaste for a confrontation with peers concerning professional judgment.

What are the implications for the second opinion program? This program is of note because it implicitly assumes some aspect of a supplier-induced demand model of medical use and at the same time, fails to appreciate the importance of two essential mechanisms in the utilization model—the importance of professional as well as consumer uncertainty in conditioning demand. Thus, on theoretical and empirical grounds the program may well be an example of regulatory policy based on mis-specification of the health care market.

The failure to recognize consumer uncertainty is illustrated by the voluntary second opinion programs of numerous third-party insurer programs such as the Medicare "experimental" second opinion programs in the Greater New York area and Detroit, and the National Second Opinion Program sponsored directly by the Department of Health and Human Services (DHHS). These programs assume that if a second opinion is designed, advertised, and included as a formal benefit in the insurance offering, it will attract consumers. The assumption includes the premise that the formal second opinion program is more effective in reducing unnecessary surgery than the reductions that occur through existing informal second opinion pathways. Unfortunately, there is little information on the issue. One thing seems clear: The voluntary use of the second opinion benefit is astonishingly small. For example, the most optimistic estimate of the number of Medicare beneficiaries in the New York Blue Cross program (with over 5 million enrollees) who will seek a second opinion is 1,200; the expected number of patients who actually avoid surgery is about 400 (DHEW, 1978). However, it is not clear who these patients will be; in McCarthy's experience, a substantial portion of second opinion patients who avoid surgery are those who are advised surgery by all advising physicians. The voluntary second opinion program certainly appears to select people who are skeptical about medical care and who actively express their uncertainty. The estimate of 1,200 seems to be too low an estimate of the annual number of skeptical surgical candidates among New York Medicare beneficiaries. One can easily imagine that many more exist and use their own ingenuity in seeking additional medical advice. Such informal second opinions come from a wide variety of sources that go beyond physicians, and include friends, (who may or may not have experienced a similar procedure), non-physician hospital personnel, health manuals, acupuncturists, and the like. The whole apparatus is ill-defined and uncontrolled, but undoubtedly influences the rates at which operations are performed. Further, one can imagine that skeptics who in the past were motivated to use informal programs are precisely those who volunteer for the formal program, so that the *net number of persons exposed to second opinions may not be altered substantially by the formal program.* Since virtually no data exists on the nature and extent of informal second opinion programs, it is difficult to estimate the relative efficiency of the formal versus the informal second opinion program. However, if the phenomenon is basically one of skeptical candidates transferring to another mode of obtaining a second opinion, the probability of reducing surgical risk to the individual is likely to be lowered in formal second opinion programs because the sources of the second opinion given in this program must be a surgeon. Under circumstances of professional uncertainty where the "best" method of treatment is not known, one must reasonably expect the bias associated with specialty training to influence clinical decision-making. Requiring that the second opinion in formal programs be from a surgeon while allowing informal second opinion users to contact any type of physician has the clear implication that surgical recommendation occurs more commonly in the formal than in the informal setting.

Failure to Recognize Physician Uncertainty

The mechanism for lowering the risk of surgery to an individual is not the same as lowering the risk to populations. Consequently, second opinion programs may not reduce risks or costs. Based on epidemiologic evidence, the programs may shift costs and risks to other persons, but they will not reduce the total volume of surgery for a population. For second opinion programs to be effective in reducing the population at risk of surgery and the per capita cost of surgery, the queue for surgery must be shortened each time a candidate is removed so that the total surgical workload on the population is reduced. However, the constancy of workload differences among areas (see Figure 4) and the large difference in numbers of cases processed by physicians when treating an essentially homogeneous population (Table 3) indicate that the removal of one individual from the queue is unlikely to affect workload. A second patient will simply move up in the queue to take the excluded candidate's place. Thus, what one should expect from second opinion programs is substitution. There are three possible types of physician response when candidates are removed from their surgical queues by second opinion programs:

Type A Substitution: The procedure content of physician workloads remains constant. However, the probabilities of receiving a procedure shift among sub-populations served by the physician; the second opinion population receives less and the non-second opinion population receives more procedures than before the program.

Type B Substitution: The procedure content of physician workloads changes to related procedures; the probabilities of receiving the substitution procedure remain similar to those for the first procedure for the second opinion population.

Type C Substitution: The procedure content of physician workloads changes to unrelated procedures; the probabilities of receiving the substituted procedure are similar between populations (assuming substitution is for a procedure for which a second opinion is not mandated).*

Because the impact on the workload of the individual physician is potentially greater, the likelihood of a substitution effect is stronger in mandatory second opinion programs. Among physicians who hold strong opinions concerning the effectiveness of a procedure targeted for review in a mandatory second opinion program, Type A substitution would be expected. For example, a gynecologist might shift his practice away from Medicaid patients to continue hysterectomies outside a second opinion program since rational behavior is to find other patients who can more easily benefit from the procedure. In this case, the workload of the physician would not alter in procedure configuration; however, the probabilities of having a specific procedure would shift among different populations of patients. In the list of substitutions above, the Massachusetts Medicaid second opinion program provides an example where one would expect a decline in the rate of a mandated procedure among the Medicaid eligible population associated with a compensatory increase in the rate among non-Medicaid population sectors. For mandatory second opinion programs where all procedures are under review, e.g., New York Shop Workers Union Program, Type A substitution would be more likely than other forms of substitutions. This could occur as the "sentinel effect" phenomenon: The consequences of getting a mandatory second opinion might appear threatening and could motivate a physician to such a shift without his actually encountering a significant number of denials among candidates referred from the mandatory population.

In the case of tonsillectomy where a declining rate has been observed, Type B substitution could occur as the procedure of isolated adenoidectomy, which in the case of the Massachusetts Medicaid Program would not come under review, is substituted for the related procedure of tonsil and adenoidectomy. Type C substitution is illustrated by a physician who, having met the need in one area of concern, is free to help with other problems. This seems a reasonable interpretation of the observed shift among ob-gyn physicians from obstetrics to gynecological procedures when the birth rate fell. Another example of Type C substitution would be a surgeon who dislikes the commitment required to continue certain operations in a second opinion program—extra forms, implications of another physician's surveillance, office time consumed by patients that may not have an operation in spite of the surgeon's careful diagnostic workup, etc. This surgeon might refer all potential candidates for a specific procedure to a colleague and emphasize other aspects of his or her surgical work.

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*Type C substitution assumes only certain procedures are mandated for second opinion as in the Massachusetts Medicaid Program.

In contrast to mandatory second opinion programs, substitutions of the type outlined above can be expected to play a much smaller role in voluntary second opinion programs, particularly at this early stage when demand for the benefit is low. In the New York Blue Shield Voluntary Second Opinion Program there were about 2,000 second opinions during two years in a population of about 5 million subscribers. On the average, this represents less than one per year per participating surgeon, and with such low volume the voluntary second opinion program must have a low "feedback signal" almost inaudible to individual physicians and should not be expected to affect their decision-making on a scale similar to mandatory programs.

This discussion indicates some ways an epidemiologic inquiry into the nature of utilization experience can provide insight into controversies that exist in economic interpretations, distinguishing weaknesses in assumptions on the nature of demand and pointing out likely pitfalls when these assumptions are translated into specific mechanisms for regulating the market for health care services. The idea that agency decision-making, unbiased by economic incentives and promoted by Government, can substantially influence population-based expenditures for and exposure to surgery is very likely inconsistent with existing patterns of surgical practice and with the way doctors and probably patients make decisions.

Summary

This paper is an example of the use of epidemiologic data to illustrate aspects of the supplier-induced demand phenomenon. Variations in rate of use of medical care among neighboring communities are described and related to their probable cause. The pattern of population use of common surgical procedures is demonstrated and interpreted as exemplifying basic variations in clinical decision-making among physicians. These variations stem from substantial intra-professional differences in evaluating illness and beliefs concerning the effectiveness of specific treatment for improving health status. The implication for the Second Surgical Opinion Programs is discussed; the data on use indicate that this program will not reduce surgery rates (or contain surgical costs) at the population level because surgical candidates who, on the basis of a second opinion, decline surgery will be replaced by other candidates who want and, in the opinion of the surgeon, need the recommended treatment.

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Utilization Review in the United States: Results From a 1976 National Survey of Hospitals

by Paul M. Gertman, Jennifer A. Anderson, Alan C. Monheit, and J. Breckenridge Eagle.

The Federal government has required hospitals to implement utilization review (UR) programs since the inception of Medicare in 1966. Over the years major revisions have been introduced in the requirements and organizational mechanisms of those programs. However, it has been difficult to assess the impact of UR programs because of a severe paucity of detailed information about them and about the effect of the revisions.

This report represents the results of a national probability-sample survey of hospital utilization review activities. This survey was carried out partially to fill the gap in our descriptive knowledge about hospital utilization review programs.

The basic data in this report were gathered through a set of questionnaires sent to 1,003 hospitals in the United States. The set comprised a 78-item questionnaire to be completed by the utilization review committee chairman and his staff and a 10-item opinion questionnaire for hospital administrators. The survey began in October 1976 and ended in March 1977.

Five hundred twenty-six hospitals (52.4%) returned one or both questionnaires; 435 returned the detailed UR questionnaire; 411 returned the administrator's questionnaire and 320 returned both instruments. There was a significantly lower response rate from small hospitals, but weighted adjustments were made to produce estimates of utilization review activities for all Medicare-certified hospitals nationwide. Average lengths of stay for Medicare patients in 1976 showed no overall differences between respondents and nonrespondents. It should be noted that there were no other data bases against which to validate independently most of the responses; indeed, the absence of data was a major reason for this survey. There is a possibility of bias in the data because of the level of response.

This report contains detailed information not only on federally funded review activities, but also on other utilization review programs that are carried out by hospitals. The results of the survey have enabled us to elucidate the national trends in UR activity since 1972, describe the extent and variability of UR activities in 1976, identify factors influencing variations in UR programs, and elicit patterns of opinions held by hospital officials about UR programs.

National Trends in Utilization Review: 1973–1976

The Professional Standards Review Organization (PSRO) legislation, was passed in the fall of 1972. In March 1974, the PSRO program issued guidelines detailing proposed requirements for concurrent review of all Medicare and Medicaid admissions and extended stays and audits of the quality of care (medical care evaluation studies). In November 1974, new Medicare and Medicaid regulations were issued, which proposed similar concurrent UR and audit requirements for hospitals to apply until local PSROs were established and could assume authority over hospital review activities. These were subsequently challenged and the admission review components enjoined by a federal district court. The whole package of proposed regulations was withdrawn, and a new set of extended stay review regulations was promulgated in the summer of

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1976. By this time, PSROs and hospitals that had received delegated review authority from PSROs were performing admission and extended stay review for over one-quarter of all Medicare hospital cases. Between the initial PSRO legislation in 1972 and fall 1976, there appears to have been a major transformation in the extent of hospital utilization review activities. Weighted estimates, based on data from the hospitals responding to our survey, indicate that the following changes took place in the four years from 1973 to 1976:

—The percentage of hospitals performing concurrent extended stay review climbed from 46 percent to 90 percent;

—The percentage of hospitals carrying out concurrent admission review programs jumped from 9 percent to 60 percent;

—The percentage of all Medicare-certified hospitals using their UR authority to recommend termination of a patient's hospital insurance benefits in at least one case per year, because of unnecessary utilization, rose from 27 percent to 59 percent;

—The average number of reported UR terminations climbed by a factor of almost three. The median number of medical audits of the quality of care in respondent hospitals rose over six-fold.

By the end of 1976, the majority of hospitals, even those not required to do so, were voluntarily carrying out concurrent admission review programs for Medicare and Medicaid patients. Throughout the nation, almost two-thirds of all hospitals had some form of concurrent extended stay review for Blue Cross, commercial insurance, and self-pay patients, and over one-third were performing admission review. Ten percent of hospitals were even performing preadmission review for some of their elective admissions.

Variability and Extent of Utilization Review Activities in Hospitals in 1976

Nationally, while UR activities clearly increased from 1973–1976, the type and extent of utilization review activities varied from hospital to hospital. Of the 435 hospitals that responded, 294 hospitals had only internally administered concurrent utilization review programs; 59 hospitals had concurrent review programs, some of which were administered by the hospital and some by external organizations; 15 hospitals had internally administered retrospective and concurrent review programs; 21 hospitals had only retrospective review programs internally administered; and 18 hospitals had all utilization review performed by external groups. In 28 cases, data were either insufficient to classify the UR programs or the hospital claimed to have no UR programs.

We also evaluated the level of concurrent review efforts and made national estimates based on the survey data. In 25 percent of all Medicare-certified hospitals, admission and extended stay review was done for all patients. In 44 percent of these hospitals, both admission and extended stay review programs existed, but review was either not performed for all major insurer groups or not performed for all patients within an insurer group. In 16 percent of the hospitals, no admission review programs existed, but extended stay review was done for all third party insurers beneficiaries and self-pay patients. In 9 percent of the hospitals, no admission review was performed, and extended stay review was done only for Medicare and Medicaid patients. Finally, in 5 percent of the hospitals, less extensive review or no utilization review was performed. Dozens of different "types" of hospital utilization review programs were identified by the following factors; a) whether the UR programs were administered internally or externally, b) whether review was done concurrently or retrospectively, or both ways, c) which insurer groups review was performed for, and d) whether review was done on all patients or only a sample of patients within each major insurer group.

While this report provides overall national estimates of average hospital UR activities in 1976, most of the quantitative analyses were undertaken to identify systematic differences in UR programs. The analyses focus on the large subpopulation of hospitals that had internally administered concurrent UR programs. This emphasis was chosen both because of the need to ensure consistency in the analyses and because most institutions with externally conducted programs could not provide precise data on the level and cost of such UR activities in their hospitals. The report also contains analyses of medical audit activities and opinions of hospital officials about UR programs from all hospitals.

The summary table on the next page presents average individual hospital measures of some utilization review activities. These averages, however, should not be taken as "typical" since almost all distributions were highly skewed to the left, and the median hospital usually had values for these parameters that were considerably less than the average. In fact, the hallmark of the simple descriptive tabulations and statistical analyses was the wide variation that existed among institutions. While many statistically significant simple correlations existed between measures of UR structure (e.g., number of insurer groups reviewed), resources inputs (e.g., nonphysician staff levels), processes (e.g., number of reviews) and results (e.g., terminations), the magnitude of the association was often weak, with correlation coefficients frequently under 0.25. Two-way cross-tabulations of variables, each broken into standard descriptive categories, usually led to cell means with coefficients of variation greater than unity. The best multivariate analyses of the number of reviews performed per hospital explained 60 percent of the variation; the best equation for the estimated cost of review activities per hospital explained 41 percent of the difference between hospitals; and the best analysis of variance of the number of extended stay terminations accounted for only 28 percent of the variation among hospitals. It should be noted that the survey did not gather data on factors such as case-mix of patients, availability of nursing home beds, etc. This might have explained some additional part of this variation. The following highlights explain variation among institutions in extent of review coverage, in review volume, in cost per review, and in the number of terminations:

Extent of Review and Review Volume: Hospitals in the northeastern and north central regions tended to perform concurrent utilization review on all patients more frequently than those in the southern and western regions of the country. Further, even after controlling for the extent of utilization review coverage and the size of the hospital, northeastern and north central hospitals performed more admission and extended stay reviews per month than did hospitals in the South and the West. Hospitals that were delegated authority by their PSRO to perform binding review for Medicare and Medicaid patients tended to have more extensive review program coverage than other hospitals. These hospitals also performed comparatively more admission and extended stay reviews per month than those not delegated. After controlling for basic volume factors, such as hospital bedsize and extent of review program coverage, the factor that explains most of the variation in number of reviews performed was the number of utilization review full-time equivalent staff members employed by the hospital.

Cost Per Review: The key factor affecting actual expenditures by a hospital for utilization review activities was the hospital's policy on compensating physicians. Of the hospitals that responded to questions about paying physicians, 79 percent reported that they did not compensate any of the physicians for their UR activity, 14 percent said they compensated only some of the physician participants (e.g., just the UR committee chairman), and slightly less than 7 percent reported paying all physicians who participated in hospital UR activities. Only 13 percent of hospitals delegated to perform binding review by the PSRO said they compensated all physicians. To assess variation among hospitals in the cost per review, the actual reported expenditures for nonphysician staff were combined with an estimated valuation of physician time of $35 per hour of reported UR work, which was the most frequent compensation in those hospitals that did pay. Using this hypothetical cost estimate, we could account for 41 percent of the variation in cost per review among respondent hospitals. The significant factor in the regression equation was the total volume of reviews performed. Hospitals performing less than 100 reviews per month had costs that were more than double the average for all other hospitals. When we excluded hospitals with these small review volumes, we could demonstrate small economies of scale. For hospitals performing between 100 and 500 reviews per month, there is a marginal decline starting at 46¢ per 100 reviews and dropping to 40¢ per 100 reviews for each 100-review interval over this range. For hospitals performing between 500 to 1500 reviews, the cost per 100 reviews declines from less than 40¢ per 100 reviews to 26¢ per 100 additional reviews, moving from 1400 to 1500 reviews per month. Beyond this point, smaller declines in costs are achieved for additional reviews. The actual reported cost of reviews performed in PSRO-delegated respondent hospitals tended to be less than the average for all other hospitals. This may have been due, in large part, to the fact that these hospitals performed more admission and extended stay reviews. When such effects of scale are held constant, there is a borderline statistically significant indication that PSRO-delegated hospitals have slightly greater costs per review.

Terminations of Health Insurance Benefits: Extensive analyses were performed of the differences among hospitals in the number of cases for which continued hospitalization was deemed unnecessary by a hospital's UR program and termination of further health insurance benefit coverage was recommended. The best level of explanation obtained was only 28 percent, in a two-way analysis of variance of the number of extended stay terminations per hospital. However, several unanticipated findings emerged from these analyses. First, it appeared that, after controlling for volume effects such as bedsize, hospitals with more extensive review programs tended to have fewer terminations than hospitals with more restricted review programs; i.e., hospitals reviewing only Medicare and Medicaid patients had higher termination rates than those reviewing all patients. Partially confirming this finding was an indication that the number of terminations per hospital and per 100 reviews increased as the proportion of review activity related to Medicare increased. One may speculate that proportionately far more terminations occur among older or chronically ill patients, who need long-term institutional care instead of acute hospital care, than among younger patients. One of the stimuli for utilization review programs was the observation in the 1950's that many elderly patients in acute-care hospitals should have been in nursing homes. The last factor that might help explain the variations in terminations per hospital and per 1000 reviews was the hospital's relationship with the PSRO. Many of the analyses of variance indicated that hospitals that performed delegated binding review for the PSRO had *lower* levels of terminations than other hospitals; in a few of the analyses, this effect was statistically significant. However, since the negative effects usually showed up in analyses that involved less than half of the respondent hospitals, and because PSRO-delegated hospitals tended to do more extensive review, this PSRO effect could be due to chance and should not be overgeneralized. In general, considerable caution should be exercised in any policy application of this survey's findings.

Opinions of Hospital Administrators and Utilization Review Chairman

Some of the most interesting findings of this national survey were the perceptions of hospital administrators and UR committee chairmen about utilization review. Highlights of their opinions are:

—39 percent of administrators and 36 percent of UR chairmen felt that more than 5 percent of hospital use in the nation was unnecessary; 20 percent in both groups felt that more than 10 percent of all hospital use was unnecessary;
—22 percent of UR chairmen and 17 percent of hospital administrators felt that more than 5 percent of all patient days in their own hospital were unnecessary;
—75 percent of administrators and charimen felt that utilization review programs had had a positive impact on the quality of patient care.

Perhaps the single most striking finding of the survey was the response to the questions about whether the respondents would continue utilization review and medical audit programs even if all Federal and private requirements for conducting them were removed. The answers were as follows:

—Among hospital administrators, almost 99 percent would continue extended stay review programs, 96 percent would voluntarily continue medical care evaluation studies, 82 percent would continue admission review programs, and 36 percent would have pre-admission review programs;
—Among utilization review committee chairmen, 77 percent would voluntarily continue extended stay review programs, 73 percent would continue medical audit studies, 62 percent would continue admission review programs, and 21 percent would have pre-admission review programs.

The majority of administrators and UR chairmen, however, would not continue to review 100 percent of all admissions and extended stays, but would develop some sampling or other selective basis for these reviews.

While these opinions might seem to constitute a solid vote of support for UR programs, it is possible that these results are biased by responses only from those more favorably disposed towards utilization review.

Possible Policy Implications of the Survey Findings

In the opinion of the investigators, the survey findings have two major implications for planners and decision-makers concerned with hospital utilization review programs. First, it appears that the *structural* goals of hospital utilization review programs are being met. Utilization review programs have been set up in almost all institutions. More patients are being reviewed than is required by State or Federal regulations. Medical audits of the quality of care are being performed in considerable numbers. Hospital review committees are, in at least a small number of cases per institution, using their powers to terminate the continued hospitalization of patients who no longer need acute hospital care. Substantial full-time levels of staff in each institution are devoting time to utilization review activities; and, in a small percentage of institutions, UR activities have led to disciplinary actions against physicians. Further, there is apparently a perceived need and considerable support for utilization review programs by hospital officials.

The survey does not tell us, however, whether dollar savings or quality improvements commensurate with the investment of resources have been or will be achieved. In fact, the second major implication of the survey findings, is that, with all other factors held constant, there may be relatively decreasing benefits from programs that conduct admission and extended stay review on all patients, as compared to programs that do not review all patients. Except for an indication that more terminations may result in UR programs proportionately devoting a high percentage of review efforts towards Medicare patients, it is not clear what the focus of UR programs should be in terms of achieving an optimal benefit-cost ratio. With tens of millions of dollars being spent annually for utilization review programs, it seems that investments in further evaluations and experiments to improve both the efficiency and the effectiveness of hospital UR programs might be worthwhile.

Summary Table of Estimated Individual Hospital Utilization Review Inputs and Activities in 1976

Number of admission and extended stay reviews performed**	6,144 reviews per year
Number of cases subject to medical quality audits*	408 cases audited per year
Number of cases of unnecessary utilization leading to terminations of health insurance benefits**	11 extended stay review and 1 admission review terminations per year
Physician-hours devoted to UR activities**	235 physician-hours per year
Direct hospital cost for UR activities, physicians and non-physician staff**	$35,880 per year

*National estimate based on data from all respondent hospital-conducted UR programs

**National estimate based only on data from respondents with internal concurrent UR programs.

Questions and Answers

Comment: To understand utilization I think that one should not concentrate on the groups of patients, but the doctors. It is common knowledge in the hospital that four or five doctors continually abuse the privilege of keeping their patient there. This is particularly so if review of the hospital is done around the time of a national holiday or an impending strike. It is easier then to find out who belongs and who is sick.

Comment: UR programs are catching elderly patients with chronic diseases who do not need to be at an acute level of hospital care.

Question: PSRO evaluation is continuing this year. But still we have the problem of comparing PSRO performance to something else. Do you have any thoughts on what we should do now that you've more or less demonstrated that there are no comparable hospitals without review with which we can compare any PSRO effect?

Paul Gertman: I suggest, based on our studies, that focus be placed on the content of the review more than the PSRO part. In the next year or two, every area will be in the PSRO program. There will not be any non-PSRO areas. In our case study, the most important factor explaining variant termination rates was whether the reviewing UR physician remained anonymous to the patient's attending physician. That was the single most important factor.

Question: In any hospitals that showed an effect (terminations), what happened to the overall patient days in that institution? Was there a net decline or anything like a substitution effect?

Paul Gertman: We've taken the Medicare data along with the same type of data that were used in the OPEL Study, and we're trying to examine changes in length of stay and patient days of care in relationship to UR characteristics, number of terminations, etc. I am not sure we will show a length-of-stay difference.

Comment: I am not sure there are any positive benefits to UR unless arrangements are made to move the patients out. I think the level of terminations that was seen simply represents a proxy of physicians' willingness to police themselves in this way. The system is not responding by moving those patients to the appropriate level of care. This has to do with some of the mechanisms for financing and provision of lower than hospital-level services.

Discussion

Roger Platt

The papers presented at this conference deal with many different aspects of physician reimbursement. In many cases, their conclusions conform to conventional wisdom. In others, they do not. Almost all reveal the great need for further research.

Some of the papers suggest that physicians, like almost everyone else, respond to economic forces. Sloan shows that when fee schedules are higher, physicians treat more Medicaid patients. Hsiao concludes that in a situation where medical care is elective and poorly insured (i.e., pregnancy), there appears to be more price competition among physicians.

Other papers provide very interesting data but raise more questions than they answer. The Mueller and Otelsberg paper shows the enormous variation in Medicare fees for common procedures. Surely, variations of this magnitude are not socially useful unless high fees are being used to attract practitioners to areas of low physician density. But in fact, the opposite is true. The highest allowable fees tend to be in areas with an abundance of physicians such as New York. The comparisons of specialist and generalist fees are interesting but marred by serious classification problems. A board-eligible (but not certified) physician may be classified as a generalist by some insurance carriers and as a specialist by others.

The study of Shaffert et. al. provides some very interesting data on physician incomes while, at the same time, showing how easy it is to misinterpret such numbers. Although there are disclaimers in the body of the report, the authors list under "Major Findings," the "average full-time equivalent earnings" for their sample of hospital based physicians. These numbers are misleading, and their presentation has inevitably led to a great deal of unfortunate publicity. I do not doubt that physicians on percentage arrangements make more money than those on salary. But the disparities are undoubtedly much smaller than the tables suggest. Furthermore, physicians working on a percentage basis may very well turn out to be substantially more productive than those working on salary. This should be a subject for future study. I would not be surprised if improved productivity fully offsets the higher "earnings" of physicians paid on a percentage basis. The high incomes of pathologists and anesthesiologists suggest that specialty choice is not dictated primarily by future income prospects. Few American medical school graduates enter these fields despite the promise of high income.

Markel's paper on the per case reimbursement experiment by Pennsylvania Blue Shield is extremely interesting but inconclusive. It should be repeated on a larger scale.

Of particular interest because of their policy implications are the papers by Burney and Gabel and by Holahan et al. Burney and Gabel show that from 1968 to 1972 the rate of change in Medicare mean allowed charges was greater for specialty care than for primary care. It would be important to know if this trend has continued since 1972. If so, it will surely undercut current federal health manpower policy which is designed to increase the percentage of American graduates entering primary care specialties.

Table 3 in the Burney and Gabel paper (reprinted from work by Sloan et. al.) also illustrates that Medicare and Medicaid have followed Blue Shield in rewarding technology over basic medical services. Medicare's usual payment for a routine follow-up office visit is $8.79. Such a visit might require, on average, about 10 minutes of physician time. On the other hand, Medicare's usual payment for an electrocardiogram, a procedure which usually requires only 2 to 3 minutes of physician time, was $l5.76. Even worse, the table suggests that both Medicare and Medicaid pay a higher percentage of the "usual fee" for an electrocardiogram than for a routine follow-up visit.

Percentage of Usual Fee Paid

	Procedure	
	Follow-up Visit	Electrocardiogram
Medicare*	76	80
Medicaid**	62	68

*Usual payment
**Fee schedule

Unfortunately, academic medical centers are becoming increasingly dependent on high reimbursement rates for specialty care as a way to finance clinical teaching programs. Medical schools are developing faculty practices composed of internists and pediatricians whose primary function is to refer patients to the surgical faculty. The primary care practices are expected to "break even." The surgical practices are expected to generate substantial amounts of revenue which can be used to support educational programs.

The Holahan paper leads to a different conclusion about physician reimbursement. In sum, the data suggest that it is very hard to construct a reimbursement system that will control physician costs. If fees are controlled, the physician can raise the volume of services. If volume is controlled, service complexity can be increased. Anyone who thinks it will be easy to control service volume and complexity in order to limit physician reimbursement is mistaken.

The McCarthy study illustrates how difficult it will be to use statistical data to determine appropriate levels of medical care. McCarthy found that in a mandatory second opinion for elective surgery study, a negative opinion led to a delay in surgery for 18% of patients. But an even more unexpected (and far less publicized) part of the study revealed that in 15% of cases where two physicians recommended surgery, the operation was not performed. It is difficult to know what conclusion to draw.

What then are the critical issues in physician reimbursement? I would list the following:

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1. Relative rates of pay for primary and secondary care—We need to translate average payments for individual services into average hourly earnings for physician services. If, as I suspect, average hourly earnings for certain types of specialty care are double and triple that for primary care, we have to decide whether current Federal reimbursement policy is at cross purposes with our stated manpower policy. I think it is.

2. Appropriate levels of physician reimbursement—At the present time, most would agree that physician incomes are not determined by market forces. If this is true, then society must ultimately determine, through regulation, what appropriate levels of physician income are. Under these circumstances, two points should be kept in mind. First, quoted physician incomes can not be readily compared to salaries of people with comparable levels of responsibility such as high-level corporate officials or senior civil servants. These individuals are likely to have far more valuable fringe benefits than physicians. For example, the total compensation of a senior GS-15 (including pension rights) may very well exceed $60,000 a year. Second, highly personalized health care requires a degree of availability that is not expected of most other workers, even those with comparable incomes.

3. Whom does the physician serve?—In his paper Redisch states that "the typical physician, acting in the interest of himself and his immediate patients, puts little weight on the larger issues of economic efficiency and social benefit." Is this bad? I think most individuals want a physician who is their agent. Physicians collectively should be involved in the resource allocation process, but to expect the individual physician to think of "economic efficiency" and "social benefit" when deciding on the care of an individual patient is to ask for a profound change in the physician-patient relationship.

4. More versus less—Ultimately, appropriate methods of physician reimbursement depend on whether one believes that Americans are receiving too much or too little health care. Fee for service practice encourages physicians to deliver more services. Capitation payments or salaries encourage physicians to deliver fewer services. Many senior government officials believe that there is too much health care being delivered. But I wonder how many believe that they have received unnecessary care. If "over-utilization" is really a major national problem, then it should affect most of us sooner or later.

5. The role of the patient—As one physician at the conference noted, a substantial percentage of health services is patient-induced. Perhaps the medical profession collectively can be blamed for overselling the value of medical care. But it is hard to blame the individual physician for ordering expensive (but harmless) tests when the patient requests them. At present, I believe that a high percentage of the overuse of ambulatory services is patient-induced. A great deal of behavioral research will be needed to see how to deal with this problem.

The role of co-payments in affecting demand for physicians services needs further study. In this regard, the results of a "natural experiment" that occurred in 1977 when the health benefits of United Mine Worker members were sharply reduced will be of great interest.

In sum, a great deal of work remains to be done. The papers presented at this conference have raised a host of crucial questions about physician reimbursement. It will require a major research effort over many years to answer them.

Lynn E. Jensen

A conference such as this one serves the very useful function of reporting results from an important set of studies to the wider research community. By so doing, it sheds light on issues that are very much on the minds of health care researchers and policy-makers. This conference and others like it begin the necessary incremental process whereby we check the "goodness of fit" between the chaotic world of reality and the world of the researchers. It will take more than the two days of this conference to digest the findings discussed here. Beyond that, effort must be devoted to examining in detail the studies themselves.

There are some general themes running through most of the presentations made at this conference that require comment. The first is that standard economic tools do have a place in the health economics field. While it is true that we must be careful of the special limitations on our tools in examining problems, it is reassuring that we can draw from the large body of current economic thought. These limitations are discussed later.

The second theme is that physicians do respond to economic incentives. To some of us it may seem incredible that this concept would be seriously questioned. In fact, it has been in question for much of the last decade. There is an important corollary to the concept that physicians respond to economic incentives; if we find we are obtaining socially unacceptable outcomes from our complex health care system, these outcomes may be more due to faulty incentive structures facing physicians, patients, insurance companies and others, than to defects in individuals' personalities or to aberrant behavior on their part. The key to obtaining outcomes that are deemed more socially desirable is to create a proper set of incentives.

One thing is very clear from the papers that were presented here. Before we undertake extensive empirical work aimed at estimating system parameters, we need to do a considerable amount of theoretical work to describe adequately that system. Furthermore, researchers and policymakers alike must be aware of the very real limitations to our understanding of this system as they involve themselves in developing policies.

First, the health care delivery system is dynamic. Yet we use comparative static tools to describe and model it. We must be very careful that we do not obtain meaningless results for the dynamic problems of the real world from our comparative static analyses. A much reported fact at this conference is that physicians' fees vary considerably by geography and by specialty. An obvious question is: What is the meaning of such an observation? If we take principally a comparative static perspective, it may imply that there is a considerable amount of market power that can be and is exercised by health care providers. From a dynamic perspective, this fee variation about a mean may imply a considerable amount of disequilibrium and be an essential part of a system attempting to adjust to a new equilibrium. We do not have a theoretical framework that adequately discriminates between these two possibilities. Furthermore, if we try to develop a policy to deal with this "problem" we would ostensibly construct it differently, depending on which situation in fact obtained. As you can see from just this example, it is very important that we spend time working on a theoretical framework which will allow us to interpret our existing empirical findings.

The second limitation to our tools relates to the type of analysis we conduct. For the most part it is partial. To analyze the health care system, we break it up into small and presumably understandable components. This reduces the number of variables to a level where we can deal with them rationally. When we segment and simplify reality, we incur costs that become very important when we proceed toward policy formation. Specifically, there is the danger that we will forget to ask the question: What else will be affected beyond the part or subpart of the system under study if identified policy variables are manipulated? In other words, if we find some undesirable phenomenon and propose policies to change it without asking questions about the side effects of the proposed policy, we can create even greater problems later on.

My major conclusion is that we should expend additional effort and time improving our understanding of the health care sector before we embark on an ambitious program of policy formation based on the research to date. Until we have a better grasp of the system and how incentives can be structured to obtain desirable results from the health care delivery system, I would suggest that piecemeal policy formation could do more harm than good.

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Uwe Reinhardt

I have enjoyed this conference, and I must say I think it was a good idea. First of all, it gives researchers a chance to meet and exchange experiences and hypotheses. Secondly, it gives researchers the opportunity to rub elbows with the world of policy, which I presume is what Washington is all about. Out in the hall, I was often asked, what does all this mean and what do we do? Now that is a very embarrassing question because it forces me and my colleagues to justify our incomes. I had always thought that when I received my Ph.D., I had been certified a social virtue and now I see you ask me to justify what I do. But since you ask, let me try to answer the question and talk about the role of research in policy making.

Policy is made on the basis of perceptions, and often because of purely political motives policy is sometimes very narrow or base. But the perceptions that people have when making policy are shaped by the available data. In many instances, this means anecdotes which are in turn shaped by prejudices. I see the role of research as two-fold: First, to enhance the quality of the perceptions that people have, that is, to improve the folklore, and secondly, to constrain the actions that are taken for purely political purposes. In fact, I view the output of research somewhat similarly to the role one ascribes to generally accepted accounting principles. Those principles are written on rubber sheets that can be stretched considerably. However, there is a limit to how much rubber can be stretched, and this limitation prevents the company from lying too much when it presents its annual report to the generalists. The same is true for research. People say there are no doctors in area X. Research can show that there are enough, or perhaps even too many. Very often statements that are made to justify political action can be narrowly circumscribed.

There are three phases to research that need to be understood. There is the bean counting phase, the interpretation phase, and the policy prescription phase. Very often, too much is asked of us as researchers. We are supposed to be into all three phases of the research and we cannot be.

Now, the bean counting phase, although important, is not a glorious job. You do not generally make full professor by counting beans, but it has to be done. I think part of the role of the Department of Health and Human Services and the Social Security Administration, after they have "counted the beans", is to make their data available for public use. It is terribly important that data that are collected are shared with the research community.

Another phase of the research is the interpretation of the data. For example, The Arthur Andersen study was quite revealing. Their tables cry out for interpretation. What does it really mean that salaried physicians earn less than physicians on percentage? Does it mean that, if we switched everyone to salary, medical care would be cheaper? You can not possibly draw such an inference without a model of the behavior of hospitals and physicians. In other words, it is almost impossible to interpret correlation tables without an underlying theory that might tell you something about causation. However, in health, zero order correlation has always been used incorrectly to draw causal inferences. Research is designed to provide the underlying theory.

People have trouble with the idea of theoretical and empirical modeling because it necessitates working in the abstract and the view is that when you abstract, you are immediately irrelevant. However, in order to do research you must engage in empirical analysis where you hold other things constant.

As was discussed in the instance of Mark Pauly's case mix paper, most people have a visceral feeling that if you change the mix of physicians in a hospital, the case mix also changes. But that does not always have to be the case. In fact, it is sometimes legitimate to ask what happens if case mix does not change, but the mix of physicians does. Empirical analysis, using multiple regression techniques, is capable of answering that question.

People are not patient when they witness the process of data interpretation because it is an iterative process. You have probably watched economists stand and verbally slice each other up—like gladiators. People always say when two economists disagree that means that they have contributed nothing. However, we are only engaging in peer review which is necessary because it is extraordinarily difficult to interpret data. When I looked at the coefficients in Charlotte Muller's paper, which indicate that as you raise the physician population ratio fees go down dramatically, I must admit that I did not quite buy those coefficients. But nevertheless, those coefficients make it extremely difficult to maintain the target income hypotheses. So a piece of information like this is useful in interpretation because it makes those of us who at one time have espoused a target income hypothesis be more careful. We must go back to the data and search for truth.

Finally, there is the policy recommendation phase. Now, that has to do with taking research—this search for truth—and interpreting what it might mean for policy action which is really political action. I think it is unreasonable to ask researchers to provide policy recommendations. I only give you the facts as I see them with my interpretation. You decide what to do with these facts. You should not ask researchers who are trained to gather and interpret data to make policy recommendations. Some researchers cannot do it by natural training, others would not have the time or may not even understand what the policy issues are. I would propose that the Department of Health and Human Services establish an office called Research Interpretation for Purposes of Policy, because who knows more about policy issues than HHS itself?

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Michael Redisch

There have been a lot of papers presented and a lot of numbers have floated around. There has also been some discussion in the halls during coffee breaks about what the proper role of research should be vis-a-vis policy and how this conference ties in to that. There is concern over whether research can make any meaningful impact on policy when the latter is performed on a day-to-day basis and research is done over a number of years.

I really feel that there is a role for research and I think it is unfortunate that the policy people are not made more aware of our role. Policy people tend to have a very short time horizon. If you look back over an extended period, you will find that, if policy makers had not gone from crisis to crisis but had developed a better understanding of the global view, our perspective might have been enlarged. I remember when I first came to Washington five years ago, people kept saying, "We really don't have time to sit back and wait five years to do anything because new national health financing legislation is going to be enacted within a year." Well, that was five years ago and people were asking very similar questions to those raised at today's conference. I know that for myself, it was discouraging to see during that time period the same option papers based on incomplete information being rewritten unknowingly for the second or third time over five or six years.

During this conference I noticed some criticism of individual papers and the amount of money spent by HEW on this kind of research. Let me keep this in perspective. Costs of health care systems are increasing at a rate of over a billion dollars a month or about 40 million dollars a day. We are talking about spending maybe 50 to 60 million dollars a year on health services research. That is about two days worth of health inflation money. If we are fortunate, we get a few policy people to come and listen to us for a few hours who then go back and make policy and talk about how we are seemingly spending so much money on academic research.

Several different issues were discussed in the papers presented today. Some people concentrated on physician fees but very few people in this conference concentrated on access to care. I suggested in my paper that access was last decade's issue, not this decade's issue. Some people did discuss utilization, but not in terms of access, just in terms of whether or not it was appropriate. Other people concentrated, not on unit fees or costs, but on expenditures, which I find encouraging. I would remind people of the simple fact that expenditures are equal to price times quantity, and not just price. A lot of people often forget that. They think that cost containment is price containment. Some people also remembered that physicians exhibit some degree of control over other nonphysician resources floating around the health care system. It would be worthwhile to try to think through these different concepts, because I personally feel that, while fees are nice to talk about, expenditures are the important elements. My personal feeling is that concentrating on the impact of physicians on expenditures for health care costs is really the direction that much of this research should be going.

In terms of the data, it is always easy to finish up a conference by calling for data, to which people respond, "How can you call for data? Health care has been around as an issue for decades". But, in fact, a lot of the data have only been generated in the last few years. For example, until the last three or four years, some of these startling figures on Medicare prevailing fees could not be nudged out of the Social Security Administration which ran the Medicare program. These data were finally made public after the Freedom of Information Act was passed. All of a sudden we find out that it is cheaper to fly someone from New York to Omaha to have a hysterectomy than to keep her in Manhattan. Although the government is finally beginning to become open about the data it collects, it is frightning to look at the papers that were given today because many papers discussed the problem of minimal data. To a lot of researchers in the field, data are numbers that come in a little green book with the words "U.S. Government Printing Office" stamped on the cover. All those numbers are taken at face value. Yet, the papers presented today show that these data need to be examined before being used. Maybe a better understanding of the data will make researchers think twice before taking those little green books and running numbers through the computer.

I do agree with Uwe Reinhardt that economists really do not prepare themselves in their professional training to make a lot of choices. They prepare themselves to present options to other people. Economists coined the phrases "policy makers" and "decision makers". And these people are never economists, but the people for whom economists work. Economists say, "Mr. or Ms. decision maker, here are the trade-offs and you choose." Because of their training, economists often feel ill equipped to deal with making these policy choices. And making policy decisions is not really their role. They would be glad to give you their normative opinion on what they think is right or wrong, but it is, after all, their normative opinion. It is not their professional opinion, because their professional opinion is really a set of choices.

An issue alluded to but not discussed directly is the papers is the major direction for health care policy in the future. There was some mention about whether we really want entry controls on physicians' services, about dramatic new financing of medical education, about major changes in the medical curriculum, and also about whether we want some kind of societal controls on new technology. In the health care market, price does not seem to play its usual role, namely, that of allocating resources. Some other force has to come into play, and society may well decide to be that force. It is really a question of whether the present situation (where the total amount of resources devoted to health care is decided indirectly by bottom-up decisions by individuals without price as a guide and where the total dollar figure is put into the budget after the fact) can

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continue. An alternative is to decide how much of the national resources are to be devoted in the aggregate to health care and to use this as a guide to build from the top down. I think the Federal government has been encouraging the bottom-up approach, because after all, the Federal government can print money. The states, on the other hand, are beginning to adopt a top down theory since they do not have that option. States have found that once health becomes a line item in their budget, they have to keep to that line item or start dropping other services. Many people are fond of saying "If you think the Federal government is bad, wait until you see the States." In fact, in health, a lot of the innovative forms of intervention have come from the States because they are the ones up against the budget wall.

Let me make a few more general remarks. I think that you have to be very careful in looking at the empirical analysis that is done. People should not fall into the trap of doing what is called ad hoc policy analysis where somebody takes a variable of choice, makes it the dependent variable, and puts it on the left-hand side of an ordinary least square regression equation. This person, then, puts on the white cloak of science and runs the equation through a computer and says, "Look, here's my regression equation and it's got to be right because the computer tells me so." This person continues, "I have this kind of ad hoc theory and the first coefficient is positive, and I thought it would be positive. The second one is negative but it's not too negative, and besides the 't' value is only one. And the third coefficient is purple, and I thought it would be chartruse, but chartruse is kind of close to purple, especially at sundown." That is what might be in store for the data being generated here. Even though the data have been run through a computer by someone who has been certified by a University as an economist, you may still want to give pause to wonder.

Let me take one more minute and tell you that I think a lot of the choices being considered today under rubric of "physician policy" are what I refer to as "jammy choice," as characterized by my discussion with my two-year-old. When he refuses to go to bed, I treat him as an adult, talking to him maturely. I offer him a choice of yellow jammies or red jammies. He, like an adult, makes a choice. . .sometimes red, sometimes yellow. Then, having been treated like an adult and made his choice, he goes to bed. With respect to an issue such as fee-for-service reimbursement, I am suggesting that people are going to be spending a lot of time on what variation of fee-for-service reimbursement they are going to want in the next few years, and they will be no better off than my two-year-old. Thank you very much.

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